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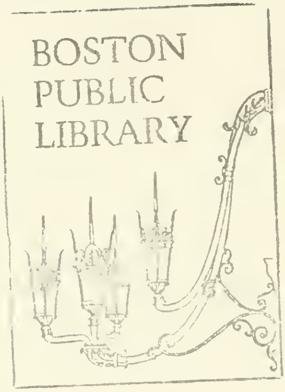

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Parking in Central Boston: Meeting the Access Needs of a Growing Downtown

Prepared for

Boston Traffic and Parking Department

Kevin H. White
Mayor

John A. Vitagliano
Commissioner

Cambridge Systematics, Inc.
with
Vanasse/Hangen Associates

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December 1983

Parking in Central Boston: Meeting the Access Needs of a Growing Downtown

prepared for

CITY OF BOSTON
BOSTON TRAFFIC AND PARKING COMMISSION

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December, 1983

Table of Contents

Executive Summary

Acknowledgements

1. Overview: Meeting the Access Needs of A Growing Downtown

Page

1.1 1972-1982: A Decade of Change 1-1
1.2 Challenges for the Future 1-2
1.3 Parking Management in Boston 1-3

2. Parking Conditions Today

2.1 Study Area Boundaries 2-1
2.2 Land Use and Transportation Characteristics of the Study Area 2-3
2.3 Parking Supply Characteristics 2-7
2.4 The Cost of Parking 2-10
2.5 Parking Availability and Use 2-17

3. Future Parking Needs

3.1 Future Development 3-1
3.2 Future Travel to the Downtown 3-6
3.3 Future Parking Supply and Demand 3-17

4. Policy Options for Addressing Future Needs

4.1 Implications of the Projected Parking Deficits 4-1
4.2 Options for Increasing Supply 4-2
4.3 Options for Better Managing the Supply 4-8
4.4 Options for Reducing the Need for Parking 4-11

5. Recommended Actions

5.1 Increasing Supply 5-1
5.2 Ensuring Midday Parking Availability 5-2
5.3 Reducing Parking Demand 5-2
5.4 Summary 5-3

Appendix A: 1982 Parking Inventory
Appendix B: Downtown Building Survey Results
Appendix C: Methodology for Projecting Future Parking Demand
Appendix D: Adapting Boston's Parking Freeze in Response to a Changing Downtown Environment
Appendix E: Guidelines for Restriping of Facilities for Compact Cars and Conversion to Attendent Parking Operations

List of Tables

Table | Page
2.1 City Owned Parking Facilities 2-9
2.2 Off-Street Supply 2-11
2.3 Parking Rates in Public Off-Street Facilities, 1982 2-14
2.4 Comparison of Parking Rates in Selected Central Cities 2-15
2.5 Monthly Parking Rates in Selected Facilities 2-16
2.6 Public Off-Street Parking Supply and Use--1982 2-18
2.7 Private Off-Street Parking Supply and Use--1982 2-21
2.8 1982 On-Street Parking Supply and Use 2-22
2.9 On-Street Parking Duration and Turnover: 10 AM - 5 PM 2-25

3.1 Development 1982-1985 3-2
3.2 Development 1986-1990 3-3
3.3 Developments 1982-1985 3-4, 3-5
3.4 Work Trips Generated by Development 1982-1985 3-9
3.5 Work Trips Generated by Development 1986-1990 3-10
3.6 Non-Work Trips Generated by Developmwnt 1982-1985 3-11
3.7 Non-Work Trips Generated by Development 1982-1985 3-12
3.8 Work Trips by Mode: 1982-1985 3-13
3.9 Non-Work Trips by Mode: 1982-1985 3-14
3.10 Work Trips by Mode: 1986-1990 3-15
3.11 Non-Work Trips by Mode: 1986-1990 3-16
3.12 Additional Peak Parking Demand Generated by Development 1982-1985 3-18
3.13 Additional Peak Parking Demand Generated by Development 1986-1990 3-19
3.14 Net Changes in Parking Supply 1982-1985 3-20
3.15 Public Off-Street Supply and Use--1985 Projections 3-22
3.16 Public Off-Street Supply and Use--1990 Projections 3-23

4.1 Future Parking Facility Proposals 4-4
4.2 Status Quo and Target Travel Patterns for Work Trips Generated by New Development 4-16

List of Figures

Figure		Page
2.1	Parking in Central Boston: Study Area	2-2
2.2	Boston Travel Trends: Comparison of the 1972 and 1982 Cordon Counts	2-5
2.3	Boston Parking Supply Characteristics	2-8
2.4	Parking in Central Boston: Resident Permit Parking Districts	2-12
2.5	Parking in Central Boston: Public Off-Street Parking Use - 1982	2-19
2.6	Parking in Central Boston: Turnover Survey Locations	2-24
3.1	Past and Future Development	3-7
4.1	Access Plan Requirements and Traffic Mitigation Measures	4-17, 18
4.2	Transportation Management Organization Agenda	4-19

Executive Summary

Background

For ten years the City of Boston has been a national leader in the use of parking policy to support the City's land use and transportation goals. A "freeze" on the number of off-street commercial parking spaces, resident permit parking, and recent improvements in parking regulation enforcement have all been used to protect Boston from problems such as the dramatic increase in traffic, the premature demolition of older buildings, the proliferation of surface lots, and the alarming drop in transit use that have plagued cities as diverse as Hartford, New Orleans, and Denver.

In 1981, the City undertook an analysis of the parking freeze which indicated that the freeze had been an effective tool for controlling parking development with minimal negative impacts. However, with Boston's development boom producing significant increases in commercial, retail, hotel and residential space in the downtown, the City undertook the first comprehensive parking study of Central Boston[1] since 1972 to assess the impacts of these developments on the City parking supply, and the most compatible ways to meet the new demand.

The objectives of the study were to:

- determine how parking supply and use have changed since 1972
- assess whether the existing parking supply will be adequate to support current and planned development
- review existing and possible alternative parking policies and recommend an integrated package of policies that would address the mobility needs of the new development while preserving the benefits of current policies.

---

[1] For the purpose of this study, the analysis focused on the predominantly commercial areas of the downtown, and Central Boston was defined as the area bounded by Massachusetts Avenue, the Southeast Expressway, the Broadway Bridge and the area across the Fort Point Channel bounded by 2nd Street and B Street.

Because there are many conflicting opinions about the actual availability of parking in the downtown, and because parking utilization can vary widely among apparently similar facilities, this study has stressed the development of an extensive and reliable data base. The data collection effort included a survey of all public and private off-street facilities (surface lots and garages) and all street segments where legal or illegal on-street parking occurs within Central Boston.

Existing Off-Street Public Parking Conditions

There are over 54,500 off-street parking spaces in the non-residential portion of Central Boston. Sixty-five (65) percent of the total off-street spaces, or about 35,000 spaces, are open to the public. The City currently owns about 12 percent of the total off-street spaces or almost 20 percent of the off-street spaces open to the public.

On a typical weekday, 88 percent of the public off-street parking spaces (i.e. spaces open to the public) are filled by 10 a.m. For the most part, individuals who have parked by 10 a.m. are long term parkers (commuters) who will use the space for the most of the day. This means that at 10 a.m. about 12 percent of the public off-street space (over 4000 spaces) is left for short-term parkers (shoppers, people on personal business, salesmen, etc.).

In downtown areas, parking facilities generally reach their peak occupancy in the 12 noon to 2 p.m. period when the overlap between all-day parkers and short-term parkers is greatest. By 12 noon, 94% of the public off-street spaces in the non-residential portion of Central Boston are filled.[1] The only areas of Central Boston with a significant surplus of public off-street spaces at noon are the Waterfront/North End area, the Back Bay Retail area, the Retail/Park Square area, and the Copley/South End area. The four areas with public off-street parking deficits (i.e. the number of existing off-street parkers exceeds the normal capacity of the off-street facilities) are the North Station area, Boston Common Garage, the Beacon Hill area, and the area across the Fort Point Channel. Three of these four areas are very attractive locations for commuter parking due to parking rates in the range of $2.00 to $3.00 per day compared to rates of $6.50 to $7.00 per day in many other areas in Central Boston.

---

[1] Many major cities (including Chicago, San Francisco, and Seattle) are currently experiencing peak occupancies in the 95-97% range.

Off-Street Parking Trends 1972–1982

In 1972, when the last major parking study was conducted in the City, approximately 82% of the public off-street parking spaces in Central Boston were filled by 12 noon. Today, as described above, about 94% of the public spaces are filled by 12 noon. While this represents a dramatic increase in peak parking occupancy, during this same period, the number of public parking spaces has increased only 4% while there has been a 23% increase in the square footage of office and retail space. In short, the City's parking policies over the past decade have allowed substantial development to occur while encouraging much better utilization of available parking supply. However, these policies should be reviewed now to determine if modifications are desirable to accommodate future development while still recognizing traffic constraints and other community objectives.

Implications for Short-Term Parkers

The vitality and economic viability of the downtown depend on meeting the parking needs of both commuters and short-term parkers including shoppers, tourists, individuals on personal business, sales and service representatives, and clients/patients visiting doctors, lawyers and other professional/personal service offices. Short-term parkers are most affected by a parking shortage for a variety of reasons including:

- most short-term parkers arrive after 10 a.m. when commuters have already had the first opportunity to find off-street parking
- MBTA and other public transit operators generally provide less service in off-peak hours making transit a less attractive alternative
- because short-term parkers may be in the downtown for anywhere from 1/2 hour to 2-3 hours, they are generally less willing to walk as far from a parking facility to their destination as a commuter who is in the area for 8 hours

As a result, as the overall parking supply becomes tighter, special measures may be required to meet the needs of short-term parkers.

Existing On-Street Parking Conditions

One traditional way to accommodate at least some short-term parking has been through on-street parking. Boston's on-street enforcement program has been designed to ensure that on-street space is used by short-term parkers. Currently, in the non-residential areas of Central Boston, there are just over 4,000 parking meters, and over 1,800 additional parking meters are planned. On the typical weekday, there are about 15,100 automobiles parked on-street at 12 noon. Since most legal on-street spaces are currently metered or are proposed to be metered, it is clear that there is substantial illegal on-street parking occurring today, which even the proposed expansion of the number of metered spaces will not accommodate.

In contrast to many other cities, where commuters park all day on the street, illegally occupying the best and least expensive spaces, the vast majority (over 80 percent) of people parking on the street in Boston (both legally and illegally) stay for two hours or less. This situation underscores the importance of putting additional meters in place, enforcing them well to maintain a high turnover of spaces, and also making off-street parking more available and attractive to short-term parkers.

Off-Street Public Parking—1985 and 1990

Based on the new development that the Boston Redevelopment Authority expects to be completed by 1985, and projects to occur by 1990, estimates of the demand for both short- and long-term parking likely to be generated by this new development were prepared for 1985 and 1990. These estimates assume that the distribution of trips among various modes (transit, auto, etc.) and factors such as average auto occupancy will remain the same as in 1982. For 1985, public parking supply was adjusted to reflect new planned public parking facilities (primarily at Lafayette Place and Copley Place) as well as the loss of existing parking facilities due to development. It was assumed that all parking spaces displaced by new development between 1985 and 1990 would be replaced on site and that the total parking supply in 1990 would be the same as in 1985.

The results of the 1985 analysis showed that currently planned developments would generate enough demand for parking to create a parking shortage of over 8,000 spaces at 12 noon (the peak occupany period). In fact, even by 10 a.m. there would be a shortage of more than 2,400 spaces overall and there would be few if any off-street spaces available for short-term parkers after 10 a.m. By 1990, the noontime shortage would be over 22,600 spaces, with a 10 a.m. shortage of 13,600 spaces.

Recommended Actions

Based on the assessment of present and potential future parking conditions a set of recommended actions for addressing future needs was developed. These actions are directed toward increasing the supply of public and private spaces, accommodating short-term parkers that arrive downtown in the midday, and reducing the demand for long-term parking. The cumulative effect of the recommended actions would be to virtually eliminate the projected 1990 parking deficit.

Increases in supply of about 8,700 spaces can be accomplished by:

- approving remaining spaces in the freeze bank (2546 spaces)
- encouraging construction of a 3000 space garage at South Station linked directly to the expressway
- encouraging construction of a 1500 space facility at North Station
- restriping major public facilities to reflect smaller car sizes (840 spaces)
- granting exemptions for proposed private spaces (480 spaces)
- encouraging attendant parking in private facilities (340 spaces)

Any of these recommendations that would increase the supply of public parking above the current freeze level (i.e., garages at North and South Stations and restriping of public garages) would require a modification to the freeze. However, changes to the freeze to allow for some increase in public spaces should limit the location of those additional spaces to areas where the street system can handle the traffic and neighborhood impacts are minimized.

Because there is a limit on where additional public parking spaces can be accommodated within Central Boston given traffic and neighborhood impacts and the construction cost for new parking facilities, explicit steps also must be taken to encourage modes of travel to downtown other than single occupant autos. These steps to reduce commuter parking demand include:

- requiring new developments to implement access plans that incorporate transit and ridesharing policies
- establishing a public/private transportation management organization to develop and make available new high-occupancy means of commuting and to coordinate downtown employer ridesharing incentive programs
- allowing freeze-exempt employee spaces to be opened to the public for a fee and expanding the freeze bank accordingly

While selected increases in parking supply and an aggressive effort to reduce commuter parking demand can go a long way in addressing Central Boston's parking needs, it will still be necessary to take a number of steps to ensure that there is adequate short-term parking available. These steps include:

- modifying rate structures at major publicly-owned facilities to discourage long-term parking, or reserving spaces for short-term parkers at these facilities
- expanding the freeze bank to include a "midday parking bank"
- amending freeze criteria to require that new public parking facilities serve non-commuter needs
- identifying new meter locations and enforcing on-street regulations

All of these actions together, selected additional parking supply, reduction in parking demand and reserving space for short-term parkers can effectively meet the City's parking needs into the next decade.

Acknowledgements

The authors of this report would like to acknowledge the significant contribution of Alex Taft (formerly with the Mayor's office); Sue Clippanger and Phil Caruso of the Traffic and Parking Department; Susan Allen, Alfred Howard and Ellen Collins of the Boston Redevelopment Authority; and Geoff Boehm of the Air Pollution Control Commission.

1.0 Overview: Meeting the Access Needs of A Growing Downtown

1.1 1972–1982: A Decade of Change

During the past decade, Boston has undergone many changes. Fourteen major office buildings have been completed, including the John Hancock Tower, the Federal Reserve Building, and One Post Office Square. These buildings added nearly ten million square feet of downtown office space, an increase of 35 percent over 1972. Office space increased in the Financial District by over 50 percent.

Several important retail developments and renovations occurred as well, including the Faneuil Hall Marketplace, the new shops along the Waterfront, and additions and renovations to Filenes, Jordan Marsh, and other establishments in the Downtown Crossing area.

Nearly 1,200 new housing units and over 900 new hotel rooms were built, and a number of educational and cultural facilities were constructed or renovated, including the Museum of Science, Suffolk University, the Berklee Performance Center, Horticultural Hall, The Institute of Contemporary Art, the Wang Center, and the Shubert and Wilbur Theatres.

This development has brought 29,000 new employees into Boston Proper, nearly 7,000 new residents[1], and many new shoppers and visitors. Creation of pedestrian spaces at the Downtown Crossing and Faneuil Hall, combined with new development has made downtown Boston a more lively and attractive environment.

Development has also brought more cars into the city, which has created a tighter parking situation. Morning traffic (6:30-9:30 a.m.) entering Boston has increased by 24 percent over the last decade.[2] Traffic through the Sumner Tunnel has increased by 37 percent. Today, there are over 7000 more vehicles parked in downtown Boston at midday than there were in 1972.[1] Despite the addition of 4,200 off-street parking spaces between 1972 and 1982, 94 percent of downtown garage and lot spaces are occupied at midday in 1982, as compared to 84 percent in 1972.

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[1] "A Review of Parking and Development in Boston Proper - 1968-1980," Boston Redevelopment Authority, April, 1982

[2] 1972 and 1982 Cordon Counts for Downtown Boston, City of Boston Traffic and Parking Department.

While Boston's public transit system has always carried a substantial portion of trips made to the downtown, it has not absorbed a share of the decade's downtown growth. Even though the MBTA has, in the last decade, extended both the Orange and Red rapid transit lines, renovated a number of downtown stations, and replaced old, unreliable cars on several transit lines, about the same number of people use transit to get downtown in the morning peak period today as in 1972. The series of fare increases in recent years (rapid transit fares increased from 25 cents in 1972 to 60 cents in 1982), the temporary service cuts instituted in 1981, the reputation for unreliable service, the inconsistent fare structure, and the considerable construction work in a number of locations throughout the past decade have contributed to the lack of growth in ridership.

At the beginning of the last decade, Boston's street and parking systems had sufficient "slack" to accommodate the growth which occurred. Today, traffic is much worse, and parking is scarce and expensive--particularly for shoppers and visitors arriving downtown in the middle of the day.

1.2 Challenges for the Future

As Boston moves into another decade of growth, meeting downtown access needs will become a critical issue. Approximately 6.9 million square feet of new office space is likely to be completed by 1985--70 percent of the increase of the last decade. By 1990, the increase over 1982 could be as high as 15.6 million square feet. With the completion of Lafayette Place and Copley Place, an unprecedented expansion of Boston's retail space will occur--these and other developments will add nearly 900,000 square feet of retail space by 1985, and as much as 1.2 million square feet by 1990.

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[1] Figures presented are for the study area used in the 1972 Parking Study conducted for the City of Boston by Wilbur Smith Associates. A larger study area was used for this report (see Chapter Two).

New downtown hotels and residential developments will add over 3,000 hotel rooms and 1,500 dwelling units by 1985, and as many as 4,600 hotel rooms and 3,500 dwelling units by 1990. Expansion of the Hynes Auditorium, construction of a new sports arena in the North Station area, and expansion of downtown theatres may also happen in the remainder of the 80's.

This development will present a challenge for the City's transportation system, in an era of limited resources for major transportation improvements. Parking will be a key facet of this transportation challenge. Expanding the parking supply to accommodate additional vehicles may not be economically feasible, with construction costs for garages running between $15,000 and $20,000 per space. Additional parking supply is likely to have significant impacts on the already intolerable downtown traffic conditions, especially since street capacity will remain relatively fixed at least until 1990, and could be undesirable from a land-use perspective. On the other hand, providing no additional parking could threaten the viability of the new developments which the City wants to encourage.

The success of both existing and new retail areas could be most severely jeopardized, as shoppers typically arrive after commuters do, and therefore are preempted from convenient and inexpensive parking spaces. Given the diverse character of the expected development, competition for parking among commuters, shoppers, and visitors is likely to increase.

1.3 Parking Management in Boston

Over the last decade, Boston has played an extremely active role in managing both on and off-street parking supply and use. The Boston Air Pollution Control Commission administered freeze on commercial off-street parking spaces, which has been in effect since 1976, has provided the City with an important tool for controlling not only aggregate supply,[1] but facility location as well. The freeze has also successfully prevented the proliferation of surface lots, and the demolition of historic buildings for parking.

---

[1] The freeze limits number of commercial off-street spaces to the 1972 supply of 35,503.

Residential permit parking programs implemented in Beacon Hill, Bay Village, St. Botolph, the South End, and recently in the Back Bay and the North End have reduced the intrusion of commuter traffic onto residential streets, and have made it easier for residents to park near their homes. The issue of commercial vehicle parking in these areas has been addressed but is not yet fully resolved.

With a goal of making more parking available for shoppers and visitors to the downtown, the City has recently more than doubled the number of legal metered parking spaces, and has stepped-up enforcement to encourage high turnover and prevent all-day parkers from preempting the most convenient parking. Despite the improved parking availability for shoppers and visitors, double parking remains a problem.

This combination of policies and programs has served to make parking supply decisions more sensitive to traffic, environmental, and aesthetic considerations, and has promoted a balanced use of downtown parking resources among different types of users. However, given the magnitude of new development which may be in store for the City, existing and new transportation and parking policies need to be examined.

The remainder of this report addresses the question of how to accommodate future growth while continuing to maintain access for a variety of downtown activities. Chapter 2.0 defines and describes the study area, and presents an assessment of what downtown parking conditions are like today, in comparison to ten years ago, in 1972. Chapter 3.0 estimates the magnitude of future access needs, given expected development. Chapters 4.0 and 5.0 present options and recommendations about the kinds of parking strategies and broader transportation policy initiatives which the City should be considering, based on the assessment of present and future conditions.

2.0 Parking Conditions Today

This chapter presents information on downtown parking supply characteristics and use, based on a complete inventory conducted for this study in 1982. To provide a context for this information, the initial two sections define and describe the land-use and transportation characteristics of the study area.

2.1 Study Area Boundaries

The boundaries of the study area (see Figure 2.1) include all of Boston Proper, and an area across the Fort Point Channel bounded by Boston Harbor, B Street, West 2nd Street, and the Broadway Bridge. The study area was divided into twelve zones for analysis purposes. Zones 1 through 7 comprised the study area of Boston's last comprehensive parking study, conducted in 1972.[1] The boundaries of these seven zones were preserved to allow for comparison between the two studies, and an additional five zones (8 through 12) were added in order to assess parking conditions in major new development areas (the Fort Point Channel and Copley) and in primarily residential areas in Boston Proper (the North End, South End, and Back Bay). As can be seen from the map in Figure 2.1, the larger zones (1, 2, 5, 6, 7, 9, 11, and 12) were subdivided to allow for more fine grained analysis of parking supply and demand.[2]

Zone 1 includes the South Station area and the Financial District

Zone 2 encompasses Government Center, Fanueil Hall, and the West End/ Charles River Park neighborhood

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[1] Wilbur Smith & Associates, "An Access-Oriented Parking Strategy for the Boston Metropolitan Area," prepared for Massachusetts Department of Public Works, in cooperation with US Department of Transportation, Federal Highway Administration, July 1974.

[2] It should be noted that development in some areas outside the study area may have an impact on parking within the study area. These areas include the hospital area, Fenway, Northeastern University, and Kendall Square.

Parking in Central Boston

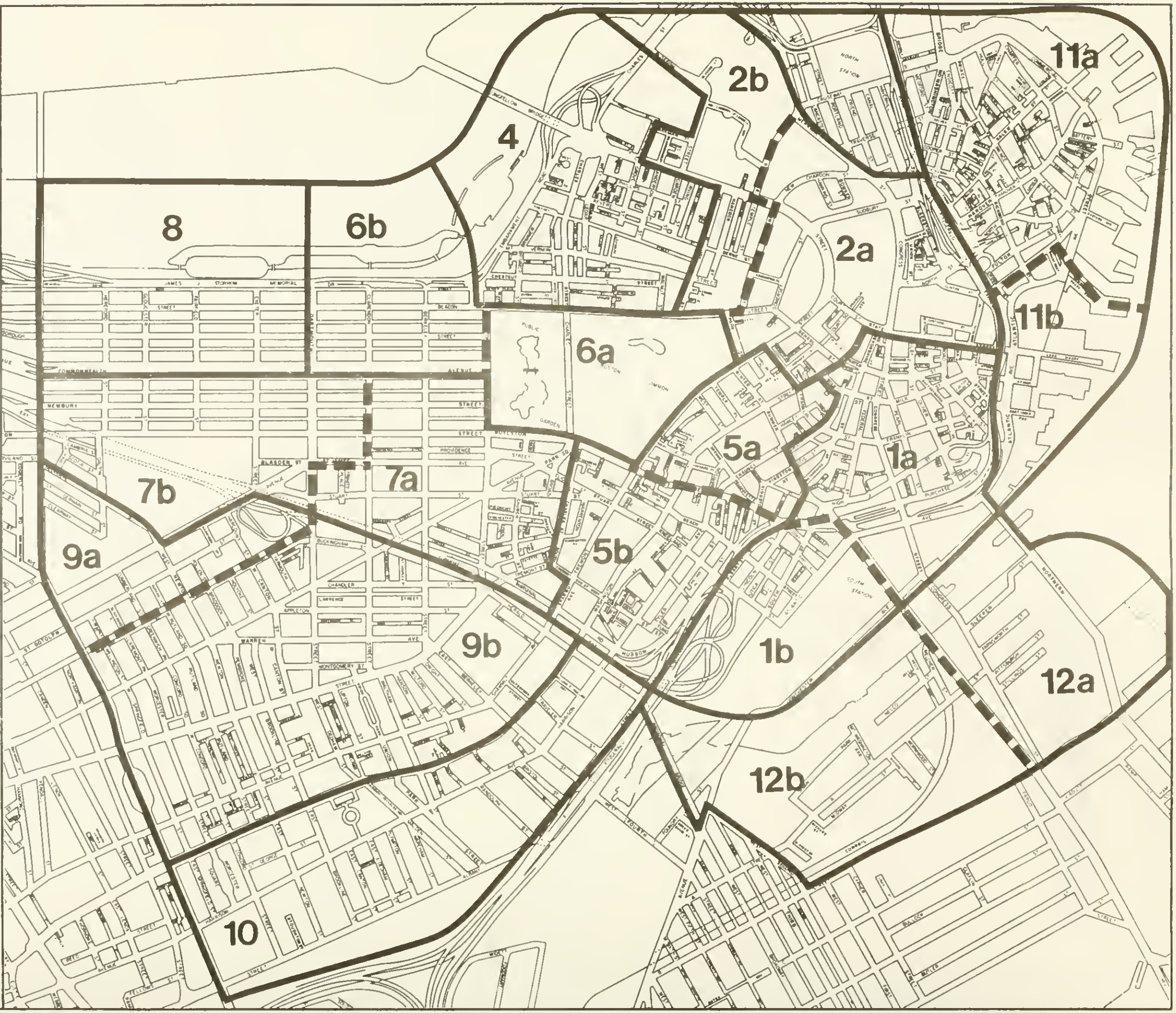
September 1983

Scale: 1" = .3 mi.

North: ◀

Figure 2.1

Study Area



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Zone 3 is the North Station area

Zone 4 is the Beacon Hill residential area

Zone 5 includes the downtown retail core, the theatre district, and Tufts Medical Center

Zone 6 includes the Boston Common, the Public Gardens, and the portion of the Back Bay east of Dartmouth Street and north of Commonwealth Avenue

Zone 7 includes the Prudential area, Copley Square, the Christian Science Center, and the Back Bay south of Commonwealth Avenue

Zone 8 encompasses the north-west portion of the Back Bay

Zone 9 includes the new Copley Place development and the northern part of the South End neighborhood

Zone 10 includes the southern portion of the South End, BU Medical Center, Boston City Hospital, and the Flower Exchange

Zone 11 includes the North End and the Waterfront area

Zone 12 is the area across the Fort Point Channel from the Financial District

2.2 Land Uses and Transportation Characteristics of the Study Area

Boston Proper encompasses an area of about 2,000 acres or 3.1 square miles. Employment is estimated to be 290,000[1]; the residential population is about 72,000. As of 1980, the area contained slightly over 50 million square feet of office and retail floor space, 6,900 hotel rooms, and 40,300 housing units.

Over 1.9 million people cross the "Cordon" of Boston Proper on an average weekday.[2] Two-thirds of these people travel in automobiles or trucks, roughly one-fourth by public transportation, and the remainder by bicycle or on foot. The total number of crossings via all public transportation modes increased for the first time in many years due primarily to over a 156 percent increase in the crossings by bus.

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[1] Boston Redevelopment Authority, "A Review of Parking and Development in Boston Proper - 1968-1980," April, 1982

[2] City of Boston, 1982 Cordon Count.

The number of people crossing the cordon between 6 am and midnight has increased by about six percent since 1972, when the last complete cordon count was conducted (see Figure 2.2). The increase in am peak period trips, (7-9 a.m.) has been more dramatic--16 percent. Overall, the distribution of trips among different travel modes (motor vehicles, public transit, and bicycles/walk) is the same today as it was in 1972; however, for trips made during the AM peak, the share of trips made using public transit (MBTA bus, rail, commuter rail, private bus, railroad, ferry) has declined slightly from 41 percent to 38 percent while vehicle use has increased from 56 to 58 percent. Thus, the number of vehicles crossing the cordon in the am peak has increased by 19 percent in the past ten years.

While the cordon count provides a good measure of travel trends in the Boston area, it does not, without adjustment, tell how many trips crossing the cordon have destinations in Boston. The proportion of "through trips" crossing the cordon has been estimated[1] to be 38 percent overall, 47 percent for auto trips and 22 percent for transit trips. Subtracting "through trips" from the 1982 cordon count data yields an estimated 459,000 daily (round) trips to Boston Proper. This does not, of course, include trips with both origins and destinations within the cordon area.

Of the 459,000 persons coming into Boston each day, 36 percent (167,000) travel by public transportation, 53 percent (245,000) travel in automobiles/trucks, and 11 percent (47,000) travel by bicycle or on foot. Assuming that the average occupancy of vehicles entering Boston is 1.42,[2] about 172,500 vehicle trips (cars and trucks) are made to Boston Proper during an average weekday.

Major vehicular access routes to Boston Proper are: the Southeast Expressway, Southampton Street, and the Broadway, Summer Street, and Northern Avenue bridges from the south; the Mass Turnpike, Storrow Drive, Commonwealth Avenue, and Huntington Avenue from the west; I-93, Route 1, Charles

---

[1] Based on 1974 data as referenced in: Boston Redevelopment Authority, "Downtown Boston Parking Programs," July 1981, p. 17.

[2] City of Boston, 1982 Cordon Count. This assumes that the occupancy of "through vehicles" is the same as that of Boston-bound vehicles.

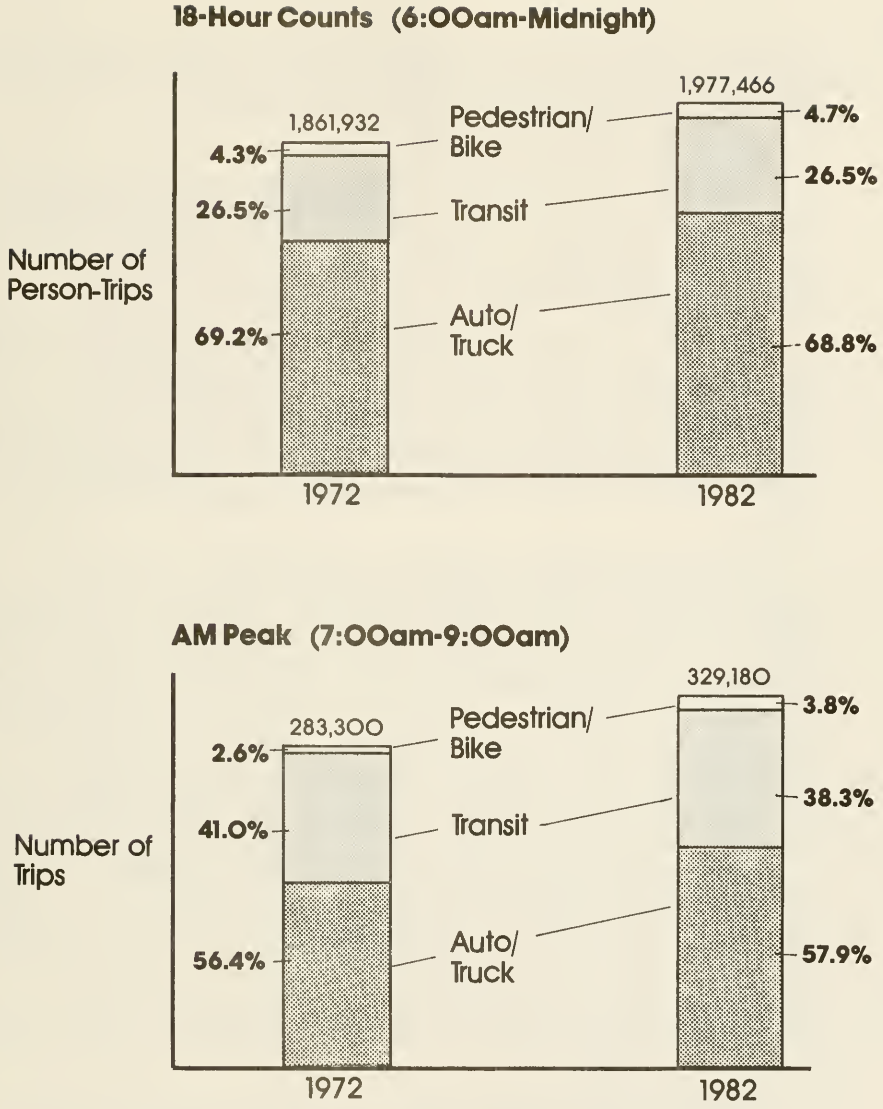

Figure 2.2 Boston Travel Trends: Comparison of the 1972 and 1982 Cordon Counts

River Dam, and the Harvard, Longfellow, and Charlestown bridges from the north; and the Sumner/Callahan tunnels from the east.

Many of these facilities operate under heavily congested, "stop-and-go" traffic conditions, during peak periods. Congestion is particularly severe in the Sumner/Callahan tunnels, on the Southeast Expressway, and on the Central Artery. In addition, traffic congestion occurs throughout the street network within Boston Proper.

While current proposals to depress the Central Artery and construct a third harbor tunnel could significantly improve traffic flow in a number of locations, they will by no means be a panacea. Traffic in Boston will continue to be a problem, causing hours of delay to drivers, adversely affecting the quality of life for downtown residents, and contributing to air pollution.[1]

Boston is well served by public transportation, in comparison to most American cities. The MBTA provides service on eight commuter rail routes, (such as the Boston-Acton line) three rail rapid transit routes (the Orange, Red, and Blue Lines), and two light rail routes (the Green Line and the Mattapan High Speed Line). Sixteen rail stations are located within Boston Proper. In addition, the MBTA provides bus service on 142 routes throughout the Boston area with an active fleet of 1,213 vehicles. In 1981, an average of 546,000 riders per weekday were served on the MBTA, system-wide.[2]

Transit improvements planned or underway include extension of the Red Line from Harvard Square to Alewife Brook Parkway, lengthening of station platforms to accommodate five (and eventually six) car trains, completion of the Quincy Adams Station, relocation of a segment of the Orange Line, and purchases of new Red Line vehicles. These improvements could increase the MBTA's rapid transit capacity by as much as 25 percent in the next decade.

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[1] Boston presently exceeds federal air quality standards for both carbon monoxide and non-methane hydrocarbons (a precursor to photochemical smog).

[2] Central Transportation Planning Staff, "Final Environmental and Socioeconomic Impact Report of the MBTA Fare Increase," September, 1982.

However, with future cutbacks in federal operating subsidies and limitations on state and local financial assistance due to Proposition 2-1/2, transit fares are likely to increase, and service expansion will be constrained.

2.3 Parking Supply Characteristics

The study area contains approximately 70,000 legal parking spaces. 54,513 spaces are provided in 346 garages and lots, and roughly 15,000 spaces are on the street (see Figure 2.3).[1]

The off-street parking supply includes about 35,000 spaces which are open to the public for a fee (henceforth referred to as "public spaces") and about 20,000 spaces which are reserved for employees, customers, and visitors to particular establishments (henceforth referred to as "private spaces").

Seventy-one percent of Boston's public, off-street parking spaces are located in 38 garages. The remaining public spaces are in 106 lots. The City of Boston presently owns seven garages and four lots with a total of 6,773 spaces or 20 percent of the public parking supply[2] (see Table 2.1).

The private off-street supply is comprised of 36 garages and 166 lots, with smaller capacities, on average, than public facilities. Forty-two percent of private spaces are owned by federal, state, or local government entities, 22 percent are owned by institutional organizations (museums, schools, hospitals, churches, and charitable organizations), and the remaining 35 percent are owned by private businesses.[3]

A zone-by-zone off-street parking supply breakdown is provided in Table 2.2. Zone 2 (Government Center/Faneuil Hall) has the highest number of spaces in any one zone--11,000 or 20 percent of the total off-street supply.

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[1] See Appendix A, the 1982 Parking Inventory for information about specific facilities.

[2] Sale of five of these garages to private developers is presently under negotiation.

[3] Source: Boston Redevelopment Authority.

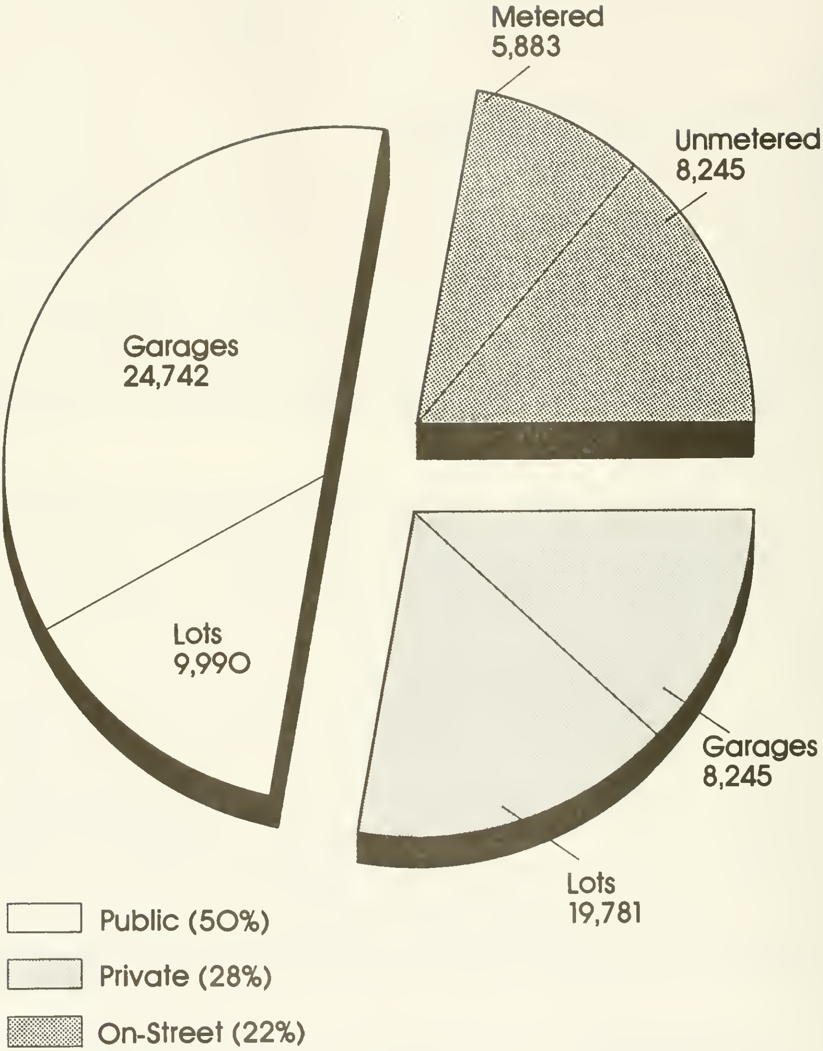

Figure 2.3 Boston Parking Supply Characteristics

Table 2.1

City-Owned Parking Facilities

Facility		Capacity
Garages		
*1.	Government Center	1,865
2.	Post Office Square	950
3.	Winthrop Square	900
*4.	Kingston/Bedford	735
*5.	Fort Hill Square	650
*6.	St. James	625
*7.	Kilby Street	400
Lots		
8.	45 Nashua Street	375
9.	Causeway Street	150
10.	N. Washington Street	63
11.	Purchase & High	60
TOTAL		6,773

---

*These facilities are likely to be sold to private developers in the near future.

Zone 7 (Back Bay/Copley) is next, with about 8,800 spaces. Zone 10 has the highest number of private parking spaces, with 4,399 or over 20 percent of the private off-street supply. Major private parking facilities in zone 10 are owned by BU Medical Center, the City of Boston, the Flower Exchange, the Boston Herald, and the Roman Catholic Archdiocese. Zone 2 has the next highest number of private spaces--3,722, most of which are reserved for City, State, and Federal government employee parking.

Over one-fourth of the study area's 33,000 garage spaces are provided in five major facilities: the Prudential Garage with 2,287 spaces and the Hancock Garage with 1,784 spaces in zone 7, the Government Center Garage with 1,865 spaces in zone 2, the Under-Common Garage with 1,500 spaces in zone 6, and the Harbor Towers Garage with 1,500 spaces in zone 11. Roughly one-fourth of the study area's 21,500 parking lot spaces are located in zone 12, the area across the Fort Point Channel.

The on-street parking supply consists of 5,883 metered spaces, and an estimated 9,000 to 10,000 additional unmetered, legal spaces, the majority of which are located in residential areas.[1] Recent on-street parking initiatives by the City have significantly changed the nature of the downtown on-street parking supply--parking fees have risen from 50 cents to $1.00 per hour in most locations, and over 1,800 new metered spaces have been added, both in locations where no meters were before, and through decreasing the length of parking spaces from 23 to 20 feet. In the Back Bay, 470 meters have been removed due to the recent institution of resident permit parking. Resident permit parking programs are also in effect (or are proposed) in Beacon Hill, Bay Village, St. Botolph, the South End, Chinatown and the North End neighborhoods (see Figure 2.4).

2.4 The Cost of Parking

A survey of 98 percent of the public spaces in the study area was conducted to determine the one hour and all-day parking rates. The results of this survey are presented in Table 2.3. The average one hour rate was found

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[1] Boston Redevelopment Authority, "A Review of Parking and Development in Boston Proper - 1968-1980," April 1982.

Table 2.2

Off-Street Supply

Number of Facilities (Number of Spaces)[1,2]

Zone	Public Lots	Public Garages	TOTAL Public	Private Lots	Private Garages	TOTAL Private	TOTAL
1	19 (1,070)	9 (4,151)	28 (5,221)	13 (466)	7 (1,161)	20 (1,627)	48 (6,848)
2	13 (782)	10 (6,408)	23 (7,190)	15 (1,018)	10 (2,704)	25 (3,722)	48 (10,912)
3	13 (1,145)	0 (0)	13 (1,145)	11 (1,530)	0 (0)	11 (1,530)	24 (2,675)
4	3 (333)	3 (925)	6 (1,258)	4 (70)	2 (66)	6 (136)	12 (1,394)
5	23 (1,182)	5 (3,422)	28 (4,604)	3 (63)	3 (284)	6 (347)	34 (4,951)
6	0 (0)	1 (1,500)	1 (1,500)	2 (29)	0 (0)	2 (29)	3 (1,529)
7	13 (672)	6 (6,267)	19 (6,939)	15 (423)	4 (1,490)	19 (1,913)	38 (8,852)
8	0 (0)	0 (0)	0 (0)	3 (61)	2 (92)	5 (153)	5 (153)
9	6 (412)	2 (669)	8 (1,081)	19 (797)	5 (1,153)	24 (1,950)	32 (3,031)
10	0 (0)	1 (250)	1 (250)	42 (4,399)	0 (0)	42 (4,399)	43 (4,649)
11	9 (898)	1 (1,150)	10 (2,048)	24 (1,118)	2 (1,185)	26 (2,303)	36 (4,351)
12	7 (3,496)	0 (0)	7 (3,496)	15 (1,562)	1 (110)	16 (1,672)	23 (5,168)
TOTAL	106 (9,990)	38 (24,742)	144 (34,732)	166 (11,536)	36 (8,245)	202 (19,781)	346 (54,513)

---

[1] Source: BRA 1981 off-street parking inventory updated in 1982.

[2] Note--Facilities with both public and private parking were only counted once, in the category under which the majority of spaces were classified.

Parking in Central Boston

September 1983

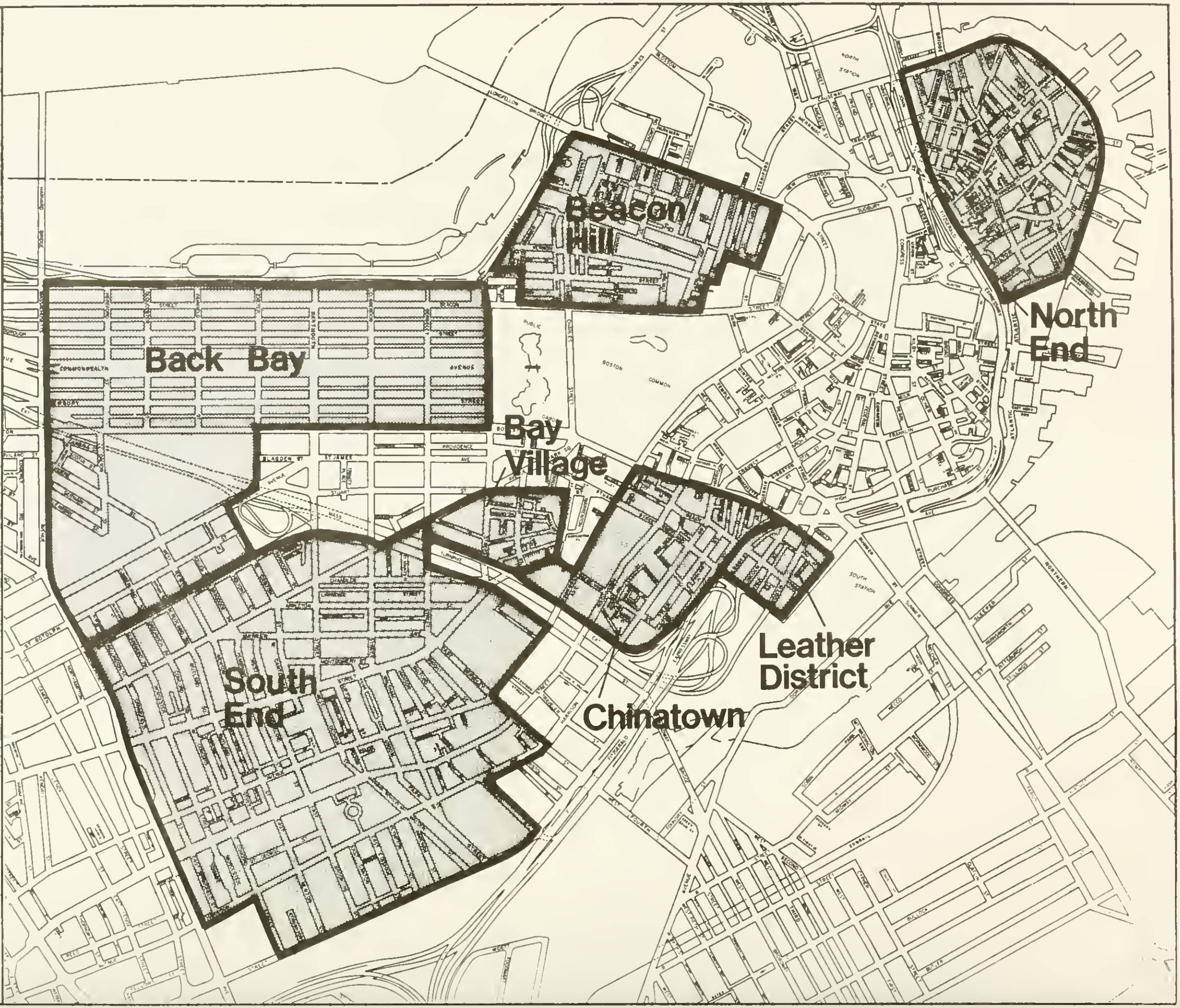
Scale: 1" = .3 mi.

North: ◀

Figure 2.4

Resident
Permit
Parking
Districts

Cambridge
Systematics. Inc.



to be $1.92, and ranged from a low of $0.75 in zone 6 (the Under Common Garage) to a high of $2.40 in zone 5, which includes the Woolworth's garage, the Beach Street Garage, and the Tufts-New England Medical Center facility. The average rate for all day parking was found to be $5.16, ranging from $2.00 in zone 12 (the Fort Point Channel area) to $6.35 in zone 2, which includes the Government Center, Pi Alley, Quincy Market, and Mass General Hospital facilities.

In 1972, average one hour and eight hour parking rates were $.82 and $2.50.[1] These 1972 rates, expressed in 1982 dollars are $1.89 and $5.77. Thus, the cost of one hour parking has increased a small amount over inflation ($1.89 in 1972 versus $1.92 in 1982), while the cost of all-day parking has actually decreased in constant dollar terms ($5.77 in 1972 versus $5.16 in 1982).

Boston's rate for one hour of parking is similar to that of Chicago, Philadelphia, Pittsburgh, San Francisco, and Seattle where average one hour rates range between $1.50 and $2.00. Boston's all-day rate is higher than all-day rates in Philadelphia, Pittsburgh, and Seattle, but less than all day rates in Chicago and San Francisco. (See Table 2.4)

The average all-day rate in public facilities does not accurately reflect the average amount paid by all-day parkers in Boston, because a number of public and private facilities offer monthly rates, and many employers provide subsidized parking for their employees. Monthly rates for parking in Boston range from $25 in the area across the Fort Point Channel to over $100 in the core area (see Table 2.5). Approximately 14,000 parking spaces are reserved for employee parking, although it is not known how many of these spaces are provided to employees for free or at subsidized rates. National data indicate, however, that the proportion of employee spaces provided for free may be quite high--a 1977 survey of urban areas found this proportion to be 80 percent.[2]

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[1] Wilbur Smith and Associates, "An Access-Oriented Parking Strategy for the Boston Metropolitan Area", July 1974, page 120.

[2] "TSM: State of the Art" UMTA/USDOT, February 1977

Table 2.3

Parking Rates in Public Off-Street Facilities: 1982

Zone	Average* 1-Hour Rate	Average 8-Hour Rate
1	$2.03	$5.44
2	2.33	6.35
3	1.65	3.24
4	1.06	6.07
5	2.40	5.61
6	0.75	3.00
7	1.85	5.50
8	-	-
9	1.97	4.33
10	1.75	5.00
11	1.74	6.09
12	1.52	2.00
All Zones	$1.92	$5.16

* Rates at individual facilities surveyed are weighted by their capacities.

Table 2.4

Comparison of Parking Rates in Selected Central Cities

City	Population (1980)	Off-Street Parking Supply	Average 1982 1-Hour Parking Price	Average 1982 8-Hour Parking Price
Boston	605,000	35,000	$1.92	$5.16
Chicago[1]	2,940,000	37,000	2.00+	5.50+
Philadelphia[2]	1,765,000	37,500	2.09	4.65
San Francisco[3]	657,000	26,000	1.20-2.00	7.00-8.00
Seattle[4]	470,000	38,000	1.50-2.00	5.00
Pittsburgh[5]	421,000	33,700	1.83	3.76

---

[1] estimate, Chicago Public Works Department

[2] Cambridge Systematics, Inc., "Parking in Center City: Present Conditions, Future Demand and Policy Options", July 1982, pp. 1-10, 1981 rates adjusted to 1982 dollars.

[3] estimate, San Francisco City Planning Department

[4] estimate, Seattle Office of Policy and Evaluation

[5] Cambridge Systematics, "Parking in Downtown Pittsburgh: Present Conditions, Future Demand, and Policy Options", January 1983, pp. 2-10.

Table 2.5

Monthly Parking Rates in Selected Facilities

Zone	Facility Location	Capacity	Monthly Rate
4	Charles Street	65	$110.00
5	Beach Street Shoppers Garage	500	$ 75.00
6	Boston Common Garage	1500	$ 65.00
7	Newbury Street (Danker & Donahue)	500	$ 80.00
7	130 Arlington Street	54	$ 55.00
9	Columbus Avenue	54	$ 90.00
11	North Street	90	$ 75.00
12	Fort Point Channel/ Pittsburgh Street	34	$ 25.00
12	Fort Point Channel/A Street	50	$ 25.00

The cost of on-street parking in the study area is $1.00 per hour at most meters. The majority of unmetered, legal spaces are in residential areas and are restricted to resident use only. However, as will be seen in the next section of this report, a considerable number of people park illegally in Boston, paying only if they receive a parking ticket.

2.5 Parking Availability and Use

In order to determine the availability of parking in different parts of the study area, cars were counted in 99 percent of the off-street parking facilities (accounting for 98 percent of the total off-street spaces) at two times during the day: 10 a.m., when most of the all-day parkers typically have arrived, and 12 noon, which is generally the time at which facilities reach their peak occupancy. In addition, cars parked on all the streets (all block faces) were counted at 10 a.m. and noon, and on-street turnover studies were conducted for a sample of block faces.

Of the 34,732 public, off-street parking spaces in the study area, 30,474 (88 percent) are occupied by 10 a.m. At noon, 32,503 (94 percent) are occupied (see Table 2.6). In four zones, the average occupancy of public facilities at 10 a.m. is over 95 percent: zone 2 (Government Center), zone 4 (Beacon Hill), zone 6 (Boston Common Garage) and zone 12 (Fort Point Channel). At noon, these zones, as well as zones 1 (Financial District/ South Station) and 3 (North Station) are over 95 percent capacity (see Figure 2.5).

The only locations where parking is available at midday are the Retail/ Park Square area (zone 5), the Copley/South End area (zones 9 and 10), the Back Bay (zone 7) and the Waterfront/North End area (zone 11). Major public facilities in these zones with available capacity include the Kingston/ Bedford garage and the Beach Street Shoppers garage in zone 5, the St. James Avenue garage in zone 7, the Colonnade Hotel garage in zone 9, and the Harbor Towers garage in zone 11.

The pattern of parking availability and use reflects both the pattern of demand for parking and the price charged in different locations. The $2.00 per day parking lots in the Fort Point Channel fill up early in the

Table 2.6

Public Off-Street Parking Supply and Use--1982

Zone	Capacity	# Parkers at 10 AM	# of Available Spaces at 10 AM	# Parkers at Noon	Surplus/ (Deficit)
1 Financial/South Station	5,221	4,699	522	5,169	52
2 Govt. Center/West End	7,190	6,394	796	6,945	245
3 North Station	1,145	1,030	115	1,191	(46)
4 Beacon Hill	1,258	1,310	(52)	1,333	(75)
5 Retail/Park Square	4,604	3,563	1,041	4,052	552
6 Boston Common/Back Bay East	1,500	1,525	(25)	1,525	(25)
7 Back Bay Retail	(6,939	6,173	766	6,265	674
8 Back Bay West	0	0	0	0	0
9 Copley/South End	1,081	894	187	883	198
10 South End/Boston City Hosp.	250	168	82	171	79
11 Waterfront/North End	2,048	1,171	877	1,326	722
12 Fort Point Channel	3,496	3,547	(51)	3,643	(147)
Total	34,732	30,474	4,258	32,503	2,229

[1] Deficits in 1982 indicate facilities that park more cars than their official capacities.

Parking in Central Boston

September 1983

Scale: 1" = .3 mi.

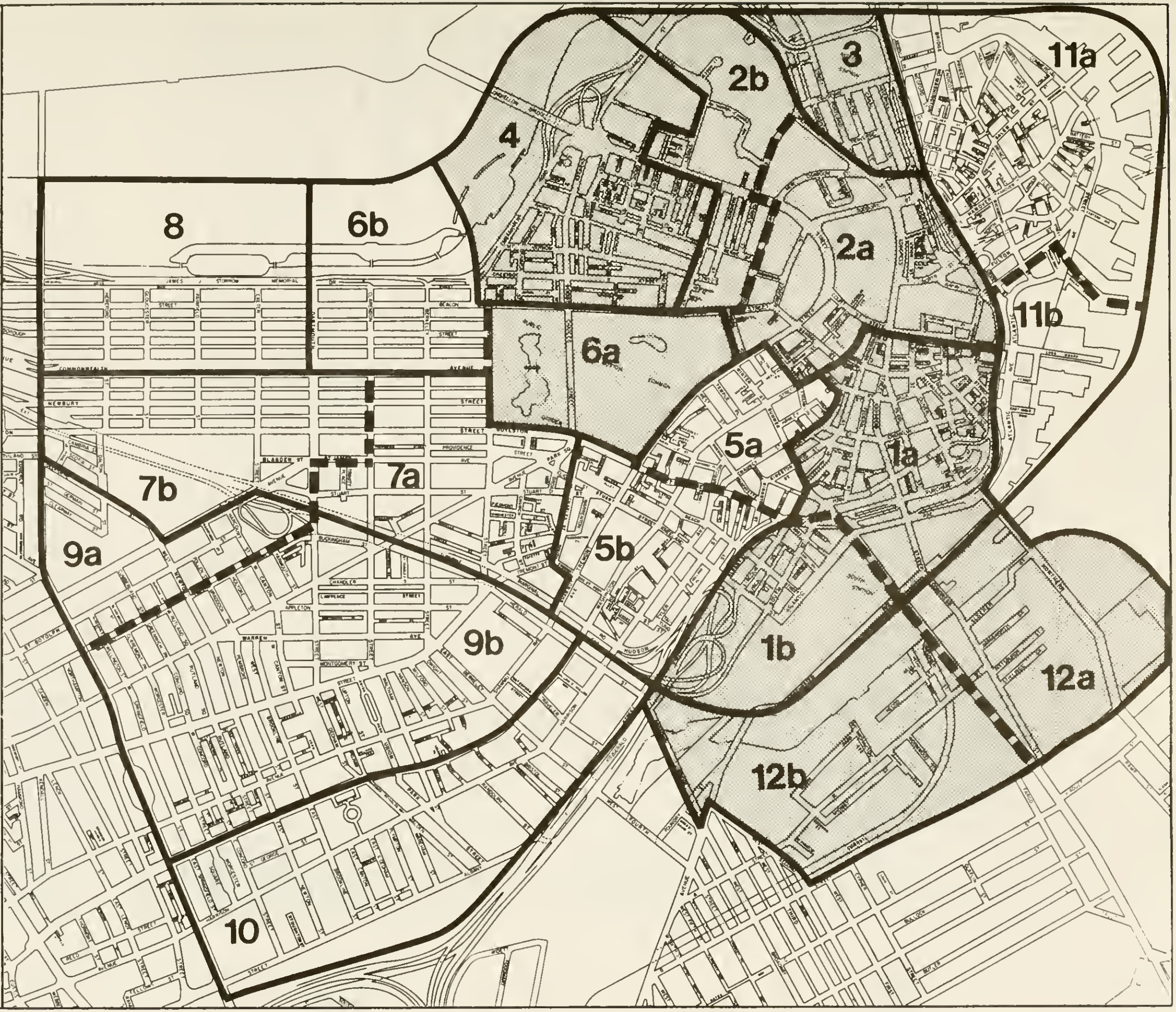
North: ◀

Figure 2.5

Public Off-Street Parking Use-1982

▨ Over 95% of spaces filled at Noon

Cambridge Systematics. Inc.



morning, as does the the Under Common Garage, which charges only $3.00 per day. In the Financial District, which has a 99 percent midday parking occupancy, there are parking lots charging over $7.00 per day that fill up by noon, indicating the high demand for parking in this part of the study area. In contrast, in zone 7 (the Back Bay/Park Square area) where the average midday occupancy is 90 percent, facilities charging $4-4.50 per day have empty spaces at noon.

Boston's overall public off-street parking occupancy of 94 percent is sufficiently high to signal concern about downtown parking availability--particularly as future development occurs. However, it is similar to occupancies in San Francisco and Chicago. Philadelphia, Los Angeles, Denver, New Orleans, Pittsburgh, Seattle, and Portland all have midday parking occupancies between 80 and 90 percent.

Table 2.7 presents parking use information collected for private, off-street facilities. Of the 19,781 private off-street spaces, 16,801 (85 percent) are occupied at 10 a.m. and 16,949 (86 percent) are occupied at noon. In comparison to public, off-street facilities, private facilities generally have lower occupancies. Only zones 1 (Financial District), 2 (Government Center) and 3 (North Station) have private facility occupancies of over 90 percent. Another major difference between usage patterns at public and private facilities is that in private facilities, about the same number of cars are parked at 10 a.m. as at noon, while in public facilities, the number of cars parked at noon is seven percent higher than the number parked at 10 a.m. This indicates a greater proportion of all-day parkers in private facilities.

On-street parking counts (see Table 2.8) found a total of 14,735 cars on the street at 10 a.m., and 15,133 at noon. In all zones, the number of parked cars exceeded the number of parking meters at the time of data collection. As virtually all of the legal parking spaces are metered in non-residential zones, the counts indicate a considerable amount of illegal parking.

In many cities, on-street parking spaces are occupied early in the morning by commuters who park all day, preventing shoppers and visitors from

Table 2.7

Private Off-Street Parking Supply and Use--1982

Zone	Capacity	# Parkers at 10 AM	# of Available Spaces at 10 AM	# Parkers at Noon	Surplus/ (Deficit)
1 Financial/South Station	1,627	1,583	44	1,616	11
2 Govt. Center/West End	3,722	3,443	279	3,450	272
3 North Station	1,530	1,432	98	1,493	37
4 Beacon Hill	136	101	35	96	40
5 Retail/Park Square	347	300	47	298	49
6 Boston Common/Back Bay East	29	22	7	26	3
7 Back Bay Retail	1,913	1,479	434	1,536	377
8 Back Bay West	153	118	35	109	44
9 Copley/South End	1,950	1,483	467	1,501	449
10 South End/Boston City Hospital	4,399	3,649	750	3,454	945
11 Waterfront/North End	2,303	1,857	446	1,860	443
12 Fort Point Channel	1,672	1,334	338	1,510	162
Total	19,781	16,801	2,980	16,949	2,832

Table 2.8

1982 On-Street Parking Supply and Use

Zone	Number of Meters at Time of Data Collection	Planned Number of Meters	Number of[1] Parkers Observed	
			10 am	Noon
1 Financial/South Station	213	926	1,082	1,015
2 Govt Center/West End	305	518	1,068	1,066
3 North Station	204	519	286	333
4 Beacon Hill	271	271	992	989
5 Retail/Park Square	172	556	822	868
6 Boston Common/Back Bay East	510 *	453	602	659
7 Back Bay Retail	752	984	1,944	2,134
8 Back Bay West	675 *	325	696	714
9 Copley/South End	294 *	352	3,024	3,062
10 South End/Boston City Hospital	245 *	287	1,350	1,326
11 Waterfront/North End	296 *	475	1,230	1,272
12 Fort Point Channel	70	217	1,639	1,695
Total	4,007	5,879	14,735	15,133

* estimated

[1] Trucks were assumed to account for 16 percent of vehicles counted. Figures shown do not include trucks.

using these convenient, inexpensive spaces. The turnover study conducted in Boston indicates, however, that 78 percent of (legal) parkers on the block faces surveyed (see Figure 2.6) parked for less than two hours, and only 6 percent parked for more than six hours (see Table 2.9). In illegal parking spaces, 87 percent of parkers stayed for less than two hours and 3 percent stayed for more than six hours. The average turnover[1] was found to be 2.9 for legal parking spaces, 2.5 for illegal spaces, and 2.6 overall. Thus, the turnover study indicates that the vast majority of both legal and illegal on-street parkers do not park all day.

The addition of over 1800 new parking meters will allow many of the current illegal parkers to find legal spaces. However, the demand for on-street parking will always be higher than the number of spaces which can be devoted for parking. Therefore, ensuring the availability of convenient and relatively inexpensive off-street parking spaces for short-term parkers will continue to be important.

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[1] Turnover is defined here as the number of cars parked per space in the seven hours between 10 a.m. and 5 p.m.

Parking in Central Boston

September 1983

Scale: 1" = .3 mi.

North: ◀

Figure 2.6

Turnover Survey Locations

Cambridge Systematics, Inc.

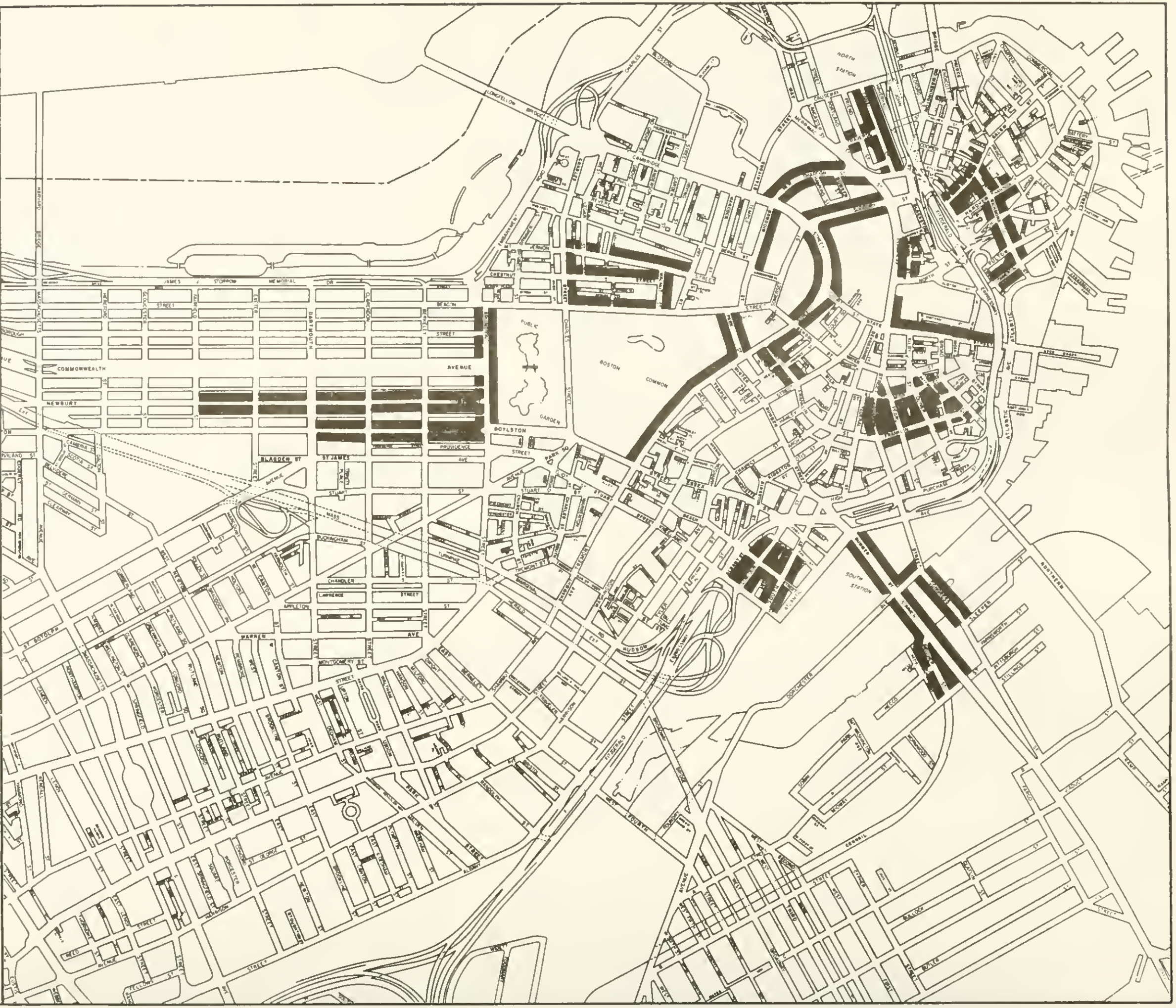

Table 2.9

On-Street Parking Duration and Turnover: 10 am - 5 pm

	Legal Parkers				Illegal Parkers				All Parkers			
Zone	% Parked 2 hrs.	% Parked 6 hrs.	Average Hours Parked	Turnover (vehicles/ space/day)	% Parked 2 hrs.	% Parked 6 hrs.	Average Hours Parked	Turnover (vehicles/ space/day)	% Parked 2 hrs.	% Parked 6 hrs.	Average Hours Parked	Turnover (vehicles/ space/day)
1a	84%	2%	1.7	3.6	85%	2%	1.7	1.9	85%	2%	1.7	2.3
1b	74%	8%	2.2	2.6	86%	1%	1.6	2.4	81%	5%	1.9	2.5
2a/b	88%	2%	1.6	3.5	91%	2%	1.4	2.5	89%	2%	1.6	3.0
3	87%	1%	1.6	3.6	91%	1%	1.4	2.2	88%	1%	1.5	3.0
4	51%	23%	3.3	2.0	64%	17%	2.7	1.8	55%	22%	3.1	2.0
5a	84%	2%	1.7	2.9	93%	2%	1.3	2.5	90%	2%	1.5	2.6
7a/b	87%	2%	1.7	3.5	89%	2%	1.5	2.3	91%	2%	1.6	2.9
11a	50%	9%	3.3	1.9	80%	4%	1.9	2.3	60%	5%	2.9	2.0
12a/b	62%	8%	2.6	2.7	92%	3%	1.5	2.0	77%	6%	2.0	2.3
ALL ZONES	78%	6%	2.0	2.9	87%	3%	1.6	2.2	82%	5%	1.8	2.6

3.0 Future Parking Needs

This chapter describes the magnitude of planned and proposed future development in Boston, and assesses the implications of this development on future travel to the downtown and on parking supply and demand.

3.1 Future Development

Tables 3.1 and 3.2 summarize expected future development by zone in two time frames: 1982-1985, and 1986-1990. The developments included in the 1982-1985 period are either now under construction, or are in planning stages; the specific developments expected in this time frame are listed in Table 3.3. The 1986-1990 development assumptions are based on the Boston Redevelopment Authority's assessment of what is likely to occur. Only some of the 1986-1990 developments have been formally proposed and approved; thus, specific developments could not be listed in this report. It should be noted that while the 1982-1985 development assumptions are fairly certain, actual development in the 1986-1990 time frame will depend on the downtown economic climate, which is difficult to predict.

Between 1982 and 1985, 6.9 million square feet of new and renovated office space will be completed, which represents an 18 percent increase over the existing stock, or over one half of the increase which occured between 1972-1982. Almost one-half of the new office space will be located in zone 1 (the financial district/South Station area), where Exchange Place and the Dewey Square development will each add one million square feet. Other major office developments include Copley Place in zone 9, and the State Transportation Building in zone 5.

Retail space is expected to increase by 896,000 square feet (14 percent) between 1982 and 1985. Lafayette Place in zone 5 and Copley Place are the two major retail developments in this time frame, accounting for over 60 percent of the increase in retail space.

In addition to office and retail developments, 3040 new hotel rooms (a 42 percent increase over the existing stock) and 1603 new dwelling units (a 4 percent increase) are expected to be completed by 1985.

Table 3.1

Development 1982-1985

Zone	Office (1000 sq ft)	Retail (1000 sq ft)	Hotel Rooms	Dwelling Units	Other
1a	2077	47	-	384	-
1b	1270	50	-	-	-
2a	490	75	350	-	-
2b	-	-	-	-	-
3	-	-	-	-	-
4	-	-	-	-	-
5a	450	287	500	-	-
5b	670	70	--	189	-
6a	-	-	-	-	-
6b	-	-	-	-	-
7a	540	7	290	190	
7b	200	20	-	40	150 Hynes Aud. Meeting Place
8	-	-	-	50	-
9a	845	300	1900	400	
9b	-	-	-	-	-
10	-	-	-	-	-
11a					
11b	200	40	-	300	
12	200	-	-	50	
TOTAL	6942	896	3040	1603	150

Source: Boston Redevelopment Authority.

Table 3.2

Development 1986-1990

Zone	Office (1000 sq ft)	Retail (1000 sq ft)	Hotel Rooms	Dwelling Units	Other	
1a	1500	12.5	300	-	125	Light Industry
b	1500	12.5	300	-	125	Light Industry
2a	-	-	-	-	-	
b	-	-	-	-	-	
3	650	-	-	-	1500	Seat Arena
4	90	5	-	-	-	
5a	-	-	-	-	-	
5b	2000	250	-	580	1500	Theatre Seats
6a	-	-	-	-	-	
6b	-	-	-	-	-	
7a	1800	-	-	175	-	
b	-	-	-	-	-	
8	-	-	-	-	-	
9a	-	-	-	-	-	
9b	-	-	-	-	-	
10	-	-	-	-	-	
11a	-	-	-	-	-	
11b	-	-	-	-	-	
12	1200	70	1000	1100	-	
TOTAL	8740	350	1600	1855		

Source: Boston Redevelopment Authority

Table 3.3

Developments 1982-1985

Zone	Development	Office (1000 sq ft)	Retail (1000 sq ft)	Hotel Rooms	Dwelling Units	Changes in Parking Supply
1a	Exchange Place	1,000	5			93
	Devonshire Towers	132	10		384	230
	Jenny Building*	25	5			
	260 Franklin Street	340	17			
	265 Franklin Street	350	10			
	155 Federal Street	180				43
	Rehab: SWC Milk & Devonshire	50				
1b	Dewey Square	1,000	30			120
	South Station	70	20			**
	Wang	200				-170
2a	Marketplace Center	350	50			-24
	Sanborn	40	10			
	Parcel 7	100	15	350		-150
5a	Lafayette Place		250	500		1,278
	Transcript Building*	50	7			
	One Franklin Place	400	30			0
5b	State Transportation Building	600	60			375
	Boylston Building	70	10			0
	Market Rate Housing (near Tufts NEMC)				100	0
	Elderly Housing (near Tufts NEMC)				89	-80
7a	Four Seasons			290	100	212
	399 Boylston Street	200	7			0
	Elderly Housing				90	-62
	Rehab*	340				0

---

* Substantial rehabs judged to impact parking demand--only net increases are shown.

**1,700-2,000 spaces planned, but not freeze-approved.

Table 3.3 (continued)

Zone	Development	Office (1000 sq ft)	Retail (1000 sq ft)	Hotel Rooms	Dwelling Units	Changes in Parking Supply
7b	One Exeter Place	200	10			0
	Prince School		10		40	0
	Hynes Auditorium (150,000 square feet of meeting rooms)					
8	Mt. Vernon Church Condominiums				50	0
9a	Copley Place	845	300	1,900	100	1,432
	Greenhouse				300	210
11b	Rowes Wharf	200	40		300	-222
12a	Boston Wharf				50	0
	Fort Point Channel* (between Summer & Congress)	200				0

* Substantial rehabs judged to impact parking demand--only net increases are shown.

Source: Boston Redevelopment Authority (1982 data)

Between 1986 and 1990, the office boom is expected to continue, with a possible increase over 1985 of 8.7 million square feet. Most of this new office development is expected to occur in zone 1 (the financial district/South Station), zone 5 (the retail/Park Square area), zone 7 (Back Bay) and zone 12 (Fort Point Channel). Along with this office development, 350,000 square feet of new retail space is expected to be constructed, primarily in conjunction with office development. In addition, 1600 new hotel rooms (in zones 1 and 12) and 1855 new dwelling units are expected to be completed between 1986 and 1990.

Figure 3.1 shows the growth in office, retail, hotel, and residential uses from 1972 to 1990, so that the future development projections can be put in perspective with the growth of the last decade.

3.2 Future Travel to the Downtown

If the projected new development is to successfully occur, a substantial number of new workers, shoppers, and visitors must be attracted to Boston. Given both the tight parking situation and the heavily congested peak period traffic conditions in Boston, it is important to anticipate future growth in travel to the downtown so that necessary steps can be taken to accommodate it.

Given the development assumptions of Tables 3.1 and 3.2, future changes in travel can be projected using a simple 2 step process:[1]

(1) Estimating the number of workers and other visitors who will be "attracted" by new development each day by applying "trip generation rates" for different land uses. Trip generation rates are derived from information on travel to existing buildings in urban areas.

(2) Allocating the projected person-trips among different travel modes: automobiles, public transportation, and "other". It was assumed that the future distribution of trips among modes would remain the same as it is today.

The analysis results are presented below.

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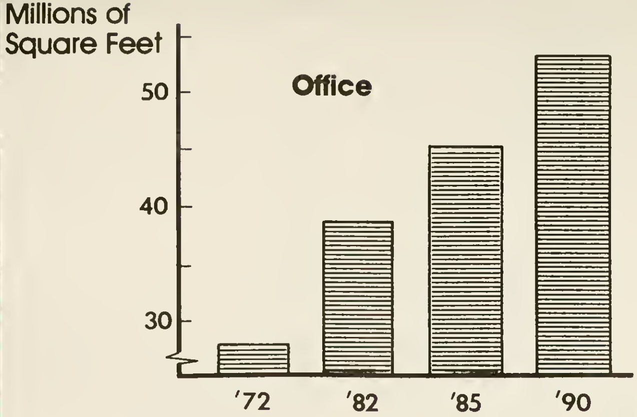
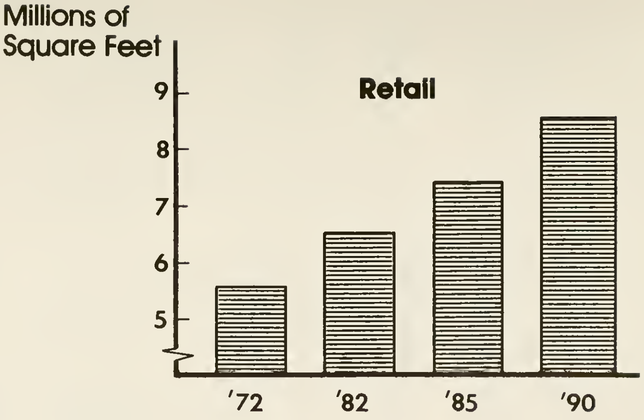
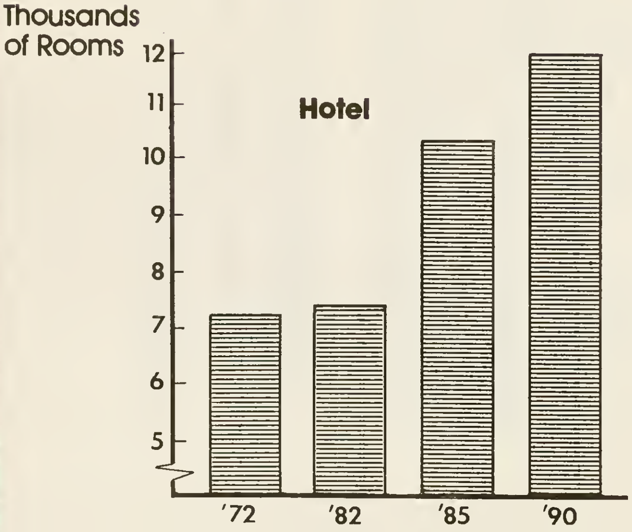
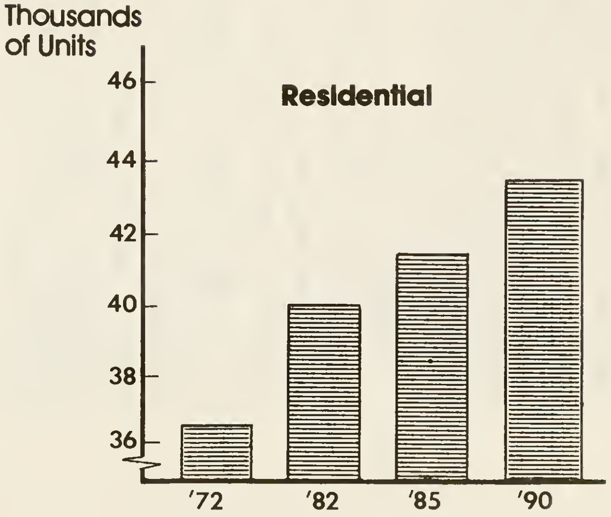
[1] Appendix C describes the specific trip generation rates and modal split assumptions employed in the analysis.


Millions of Square Feet
Office
50
40
30
'72
'82
'85
'90


Millions of Square Feet
Retail
9
8
7
6
5
'72
'82
'85
'90


Thousands of Rooms
Hotel
12
11
10
9
8
7
6
5
'72
'82
'85
'90


Thousands of Units
Residential
46
44
42
40
38
36
'72
'82
'85
'90

Tables 3.4 through 3.7 show the projected numbers of work and "non-work" trips[1] which may be generated by new development in the 1982-1985 and 1986-1990 time frames. Development in the 1982-1985 period is projected to generate a total of 74,773 new daily trips to Boston--44 percent of which would be work trips. Projections for 1986 to 1990 indicate an additional 67,652 daily trips (55 percent work trips). Thus, by 1990, about 142,000 new trips (including 70,000 work trips) to Boston are projected, based on the development assumptions.

Tables 3.8 through 3.11 allocate the projected work and non-work trips in the two time frames to different modes of travel. The analysis indicates that in the 1982-1985 period, 12,707 (39 percent) of the 32,624 new work trips will be made in automobiles. Applying an average automobile occupancy of 1.51 (see Appendix C), this translates into an additional 8,416 daily automobiles coming into Boston. Of the 42,149 non-work trips generated in the 1982-1985 period, 17,966 (43 percent) will be made in automobiles. Assuming an automobile occupancy of 1.31 yields an estimated 13,714 additional vehicle trips. Combining the work and non-work travel projections, development between 1982-1985 is estimated to attract a total of 30,673 people in 22,130 automobiles, and 44,100 people in mass transit, bicycles, and on foot.

Development between 1986-1990 will attract an additional 28,641 persons in 20,314 automobiles, and 39,011 people traveling by transit, bicycles, and on foot. Thus, by 1990, an additional 42,444 automobiles may be coming into the downtown each day,[2] and an additional 76,500 people will be using the transit system.[3] This implies that the increase in vehicles crossing the cordon between 1982 and 1990 will be in the neighborhood of 20 percent--equivalent to the increase which occurred between 1972 and 1982.

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[1] Non-work trips include those made by shoppers, tourists, salesmen, delivery people, and other types of visitors to the downtown.

[2] Includes trips originating in the study area.

[3] Assuming 8 percent of the non-drivers will walk, bike, or use taxis (1982 cordon count).

Table 3.4

Work Trips Generated by Development 1982-1985

Zone	Number of Work Trips Office	Retail	Hotel	Total
1a	8100	132	-	8232
1b	4953	140	-	5093
2a	1911	210	350	2471
2b	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5a	1755	804	500	3059
5b	2613	196		2809
6a	-	-	-	-
6b	-	-	-	-
7a	2106	20	290	2416
7b	780	56		836
8	-	-	-	-
9a	3296	840	1900	6036
9b	-	-	-	-
10	-	-	-	-
11b	780	112	-	892
12	780	-	-	780
TOTAL	27,074	2510	3040	32,624

Table 3.5

Work Trips Generated By Development 1986-1990

	Number of Work Trips					
Zone	Office	Retail	Hotel Rooms	Dwelling Units	Other	Total
1a	5850	35	300	-	106	6291
1b	5850	35	300	-	106	6291
2a	-	-	-	-	-	-
2b	-	-	-	-	-	-
3	2535	-	-	-	-	2535
4	351	14	-	-	-	365
5a	-	-	-	-	-	-
5b	7800	700	-	-	-	8500
6a	-	-	-	-	-	-
6b	-	-	-	-	-	-
7a	7020	-	-	-	-	7020
7b	-	-	-	-	-	-
8	-	-	-	-	-	-
9a	-	-	-	-	-	-
9b	-	-	-	-	-	-
10	-	-	-	-	-	-
11a	-	-	-	-	-	-
11b	-	-	-	-	-	-
12	4680	196	1000	-	-	5876
TOTAL	34086	980	1600	0	212	36878

Table 3.6

Non-Work Trips Generated by Development 1982-1985

Zone	Office	Retail	Hotel	Total
1a	4,362	808	-	5,170
1b	2,667	860	-	3,527
2a	1,029	1,290	1,400	3,719
2b	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5a	945	4,936	2,000	7,881
5b	1,407	1,204	-	2,611
6a	-	-	-	-
6b	-	-	-	-
7a	1,134	120	1,160	2,414
7b	420	344	-	764
8	-	-	-	-
9a	1,775	5,160	7,600	14,535
9b	-	-	-	-
11a	-	-	-	-
11b	420	688	-	1,108
12	420	-	-	420
TOTAL	14,579	15,410	12,160	42,149

Table 3.7

Non-Work Trips Generated By Development 1986-1990

	Number of Non-Work Trips					
Zone	Office	Retail	Hotel Rooms	Dwelling Units	Other	Total
1a	3150	215	1200	-	-	4565
1b	3150	215	1200	-	-	4565
2a	-	-	-	-	-	-
2b	-	-	-	-	-	-
3	1365	-	-	-	-	1365
4	189	86	-	-	-	275
5a	-	-	-	-	-	-
5b	4200	4300	-	-	-	8500
6a	-	-	-	-	-	-
6b	-	-	-	-	-	-
7a	3780	-	-	-	-	3780
7b	-	-	-	-	-	-
8	-	-	-	-	-	-
9a	-	-	-	-	-	-
9b	-	-	-	-	-	-
10	-	-	-	-	-	-
11b	-	-	-	-	-	-
11b	-	-	-	-	-	-
12	2520	1204	4000	-	-	7724
TOTAL	18354	6020	6400	0	0	30774

Table 3.8

Work Trips by Mode: 1982-1985

Zone	Auto[1] Person-Trips	Vehicle[2] Trips	Transit Bike, Walk Trips
1a	2,881	1,908	5,351
1b	2,037	1,349	3,056
2a	865	573	1,606
2b	-	-	-
3	-	-	-
4	-	-	-
5a	918	608	2,141
5b	1,123	744	1,686
6a	-	-	-
6b	-	-	-
7a	966	640	1,450
7b	376	249	460
8	-	-	-
9a	2,715	1,798	3,321
9b	-	-	-
10	-	-	-
11a	-	-	-
11b	358	237	534
12	468	310	312
TOTAL	12,707	8,416	19,917

[1] Number of persons traveling in automobiles.

[2] Number of automobiles derived from auto person-trips by assuming an average auto occupancy of 1.51 (see Appendix C for discussion of auto occupancy assumptions).

Table 3.9

Non-Work Trips by Mode: 1982-1985

Zone	Auto[1] Person-Trips	Vehicle[2] Trips	Transit Bike, Walk, Taxi Trips
1a	1,422	1,086	3,748
1b	1,376	1,050	2,151
2a	1,432	1,093	2,287
2b	-	-	-
3	-	-	-
4	-	-	-
5a	2,758	2,106	5,123
5b	1,097	837	1,514
6a	-	-	-
6b	-	-	-
7a	1,159	885	1,255
7b	397	303	367
8	-	-	-
9a	7,558	5,769	6,977
9b	-	-	-
11a	-	-	-
11b	532	406	576
12	235	179	185
TOTAL	17,966	13,714	24,183

[1] Number of persons traveling in automobiles.

[2] Number of automobiles derived from auto person-trips by assuming an average auto occupancy of 1.31 (see Appendix C for discussion of auto occupancy assumptions).

Table 3.10

Work Trips by Mode: 1986-1990

Zone	Auto[1] Person-Trips	Vehicle[2] Trips	Transit Bike, Walk, Taxi Trips
1a	2,202	1,458	4,089
1b	2,516	1,666	3,775
2a	-	-	-
2b	-	-	-
3	761	504	1,774
4	110	73	255
5a	-	-	-
5b	3,400	2,252	5,100
6a	-	-	-
6b	-	-	-
7a	2,808	1,860	4,212
7b	-	-	-
8	-	-	-
9a	-	-	-
9b	-	-	-
10	-	-	-
11a	-	-	-
11b	-	-	-
12	3,526	2,335	2,350
TOTAL	15,323	10,148	21,555

---

[1] Number of persons traveling in automobiles.

[2] Number of automobiles derived from auto person-trips by assuming an average auto occupancy of 1.51 (see Appendix C for discussion of auto occupancy assumptions).

Table 3.11

Non-Work Trips by Mode: 1986-1990

Zone	Auto[1] Person-Trips	Vehicle[2] Trips	Transit Bike, Walk, Taxi Trips
1a	1,255	958	3,310
1b	1,780	1,359	2,785
2a	-	-	-
2b	-	-	-
3	478	365	887
4	96	73	179
5a	-	-	-
5b	3,570	2,725	4,930
6a	-	-	-
6b	-	-	-
7a	1,814	1,385	1,966
7b	-	-	-
8	-	-	-
9a	-	-	-
9b	-	-	-
10	-	-	-
11a	-	-	-
11b	-	-	-
12	4,325	3,301	3,399
TOTAL	13,318	10,166	17,456

[1] Number of persons traveling in automobiles.

[2] Number of automobiles derived from auto person-trips by assuming an average auto occupancy of 1.31 (see Appendix C for discussion of auto occupancy assumptions).

3.3 Future Parking Supply and Demand

Tables 3.12 and 3.13 display the additional peak[1] parking demand projected for 1982-1985 and 1986-1990. Peak parking demand for work and non-work trips was calculated by applying average turnover rates[2] to the vehicle trips projected in Tables 3.8 through 3.11. Residential parking demand was calculated based on assumptions about automobile ownership and residents' use of automobiles during the day.[3] It should be noted that the figures shown in the tables represent unconstrained demand--the ac- tual number of parkers in the future will depend on price and supply conditions.

In the next three years (1982-1985), peak parking demand is expected to increase by 13,800 spaces--890 (7 percent) for residential parkers, 8,416 (61 percent) for commuters, and 4,458 (32 percent) for shoppers and visitors. In the longer term (1986-1990), peak parking demand is expected to increase by an additional 14,518 spaces (over 1985)--1,030 (7 percent) for residential parkers, 10,148 (70 percent) for commuters, and 3,340 (23 percent) for shoppers and visitors.

Future parking supply in 1985 was estimated by subtracting from 1982 supply figures the capacity of parking facilities which would be displaced by new development, and adding planned accessory parking spaces which have been approved by the Boston Air Pollution Control Commission. Net changes in parking supply between 1982 and 1985 in each zone are shown in Table 3.14. The 1990 parking supply could not be projected in a similar manner, due to the uncertainty of development plans. Thus, it was assumed that the number of parking spaces in each zone would not change between 1985 and 1990--that is, that all parking spaces displaced by new development would be replaced on site.

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[1] "Peak" parking demand is the number of parked vehicles present at the time of maximum parking accumulation (typically midday). It is less than the total number of parkers over the course of the day due to turnover of spaces.

[2] 1.0 for work trips and 2.67 for non-work trips.

[3] See Appendix C for specific assumptions.

Table 3.12

Additional Peak Parking Demand Generated by Development 1982-1985

Zone	Number of Parking Spaces Required to Accommodate Demand		
	Work*	Non-Work	Residential
1a	1,908	408	213
1b	1,349	394	-
2a	573	343	-
2b	-	-	-
3	-	-	-
4	-	-	-
5a	608	714	-
5b	744	315	105
6a	-	-	-
6b	-	-	-
7a	640	246	105
7b	249	313**	22
8	-	-	28
9a	1,798	1,506	222
9b	-	-	-
10	-	-	-
11a	-	-	-
11b	237	152	167
12	310	67	28
TOTAL	8,416	4,458	890

* Parking spaces required for work trips equals number of work related vehicle trips from Table 3.8 (turnover of 1). Non-work trip parking spaces requirement derived from assuming a turnover rate of 2.67 for office and retail vehicle trips and .25 spaces for each hotel room.

**Includes and assumption that Hynes Auditorium expansion will generate demand for 200 additional spaces in the peak.

Table 3.13

Additional Peak Parking Demand Generated by Development 1986-1990

Zone	Number of Parking Spaces Required to Accommodate Demand		
	Work*	Non-Work	Residential
1a	1,459	340	-
1b	1,666	450	-
2a	-	-	-
2b	-	-	-
3	504	137	-
4	73	28	-
5a	-	-	-
5b	2,251	1,020	322
6a	-	-	-
6b	-	-	-
7a	1,860	519	97
7b	-	-	-
8	-	-	-
9a	-	-	-
9b	-	-	-
10	-	-	-
11a	-	-	-
11b	-	-	-
12	2,335	846	611
TOTAL	10,148	3,340	1,030

* Parking spaces required for work trips equals number of work related vehicle trips from Table 3.10 (turnover of 1). Non-work trip parking spaces requirement derived from assuming a turnover rate of 2.67 for office and retail vehicle trips and .25 spaces for each hotel room.

Table 3.14

Net Changes in Parking Supply 1982-1985

Zone	Public	Private	Total
1a	(43)	323	280
1b	0	(50)	(50)
2a	0	(174)	(174)
2b	0	0	0
3	0	0	0
4	0	0	0
5a	1,278	0	1,278
5b	195	100	295
6a	0	0	0
6b	0	0	0
7a	(62)	212	150
7b	0	0	0
8	0	0	0
9a	532	1,110	1,642
9b	0	0	0
10	0	0	0
11a	0	0	0
11b	(222)	0	(222)
12	0	0	0
TOTAL	1,678	1,521	3,199

Tables 3.15 and 3.16 present a comparison of future (1985 and 1990) parking demand and supply, in a format similar to Table 2.8, in which 1982 supply and use were presented. Future parking demand at 10 am was calculated by adding work-related and residential parking demand generated by new development to the number of parkers observed at 10 am in 1982. Future demand at 12 noon was calculated by adding the total (work, non-work, and residential) additional parking demand projected to the number of parkers observed at 12 noon in 1982.

Because of the City's prime concern about availability of parking spaces to the general public, Tables 3.15 and 3.16 include only public parking supply and use. Thus, future parking capacity only includes changes in public supply. However, increases in the private parking supply will reduce the demand for public parking, thus, the number of new private spaces were deducted from the demand columns of the tables.

In 1985 (Table 3.15), despite an increase in parking supply of 3,199 spaces, projected parking demand at 10 am is 107 percent of supply; at noon projected parking demand is 122 percent of supply. A parking deficit of 2,439 spaces at 10 am and 8,114 spaces at noon is projected.

In 1990 (Table 3.16), projected 10 am demand is 137 percent of supply and projected 12 noon demand is 161 percent of supply. Projected parking deficits are 13,617 spaces at 10 am and 22,632 spaces at noon.

Table 3.15

Public Off-Street Supply and Use--1985 Projections

Zone		Capacity	Parking Demand @ 10 AM[1,2]	10 AM Surplus/ (Deficit)	Parking Demand Noon[1]	Peak Surplus/ (Deficit)
1	Financial/South Station	5,178	7,896	(2,718)	9,168	(3,990)
2	Govt. Center/West End	7,011	6,962	49	7,856	(845)
3	North Station	1,145	1,030	115	1,191	(46)
4	Beacon Hill	1,258	1,310	(52)	1,333	(75)
5	Retail/Park Square	6,077	4,920	1,157	6,438	(361)
6	Boston Common/Back Bay East	1,500	1,525	(25)	1,525	(25)
7	Back Bay Retail	6,877	7,089	(212)	7,628	(751)
8	Back Bay West	0	28	(28)	28	(28)
9	Copley/South End	1,613	2,504	(891)	3,229	(1,686)
10	South End/Boston City Hospital	250	168	82	171	79
11	Waterfront/North End	2,048	1,575	473	1,882	166
12	Fort Point Channel	3,496	3,885	(389)	4,048	(552)
	Total	36,453	38,892	(2,439)	44,567	(8,114)

---

[1] The figures in these columns were calculated as follows:

Projected additional parking demand to be generated 1982-85 was added to the number of present (1982) parkers. Then, the number of planned and approved private spaces were deducted from the demand. It should be noted that an additional 480 reserved employee spaces have been planned, but not yet freeze-approved (120 in zone 1, 60 in zone 5, and 300 in zone 11b).

[2] Includes residential parkers.

Table 3.16

Public Off-Street Supply and Use--1990 Projections

Zone		Capacity	Parking Demand @ 10 AM[1,2]	10 AM Surplus/ (Deficit)	Parking Demand @ Noon[1]	Peak Surplus/ (Deficit)
1	Financial/South Station	5,178	11,021	(5,843)	13,142	(7,964)
2	Govt. Center/West End	7,011	6,962	49	7,797	(786)
3	North Station	1,145	1,534	(389)	1,832	(687)
4	Beacon Hill	1,258	1,383	(125)	1,434	(176)
5	Retail/Park Square	6,077	7,493	(1,416)	10,031	(3,954)
6	Boston Common/Back Bay East	1,500	1,525	(25)	1,525	(25)
7	Back Bay Retail	6,877	9,046	(2,169)	10,104	(3,227)
8	Back Bay West	0	28	(28)	28	(28)
9	Copley/South End	1,613	2,504	(891)	3,299	(1,686)
10	South End/Boston City Hospital	250	168	82	171	79
11	Waterfront/North End	2,048	1,575	473	1,882	166
12	Fort Point Channel	3,496	6,831	(3,335)	7,840	(4,344)
	Total	36,453	50,070	(13,617)	59,085	(22,632)

---

[1] 1985 Supply assumptions were used as there is uncertainty about the specific parcels on which development may occur, and about accessory parking plans. Thus, these capacity figures reflect the assumption that there would be no net increase in parking between 1985 and 1990--that is, any parking displaced by new development would be replaced on site.

[2] Includes residential parkers.

4.0 Policy Options for Addressing Future Needs

4.1 Implications of the Projected Parking Deficits

A projected parking deficit of 22,000 spaces by 1990 does not, of course, mean that 22,000 cars will be circling the downtown, in fruitless search of parking. It simply means that to comfortably handle the projected development, transportation supply and use must adjust to accommodate a substantial number of new trips.

Some degree of adjustment will automatically occur as new development comes on line. Parking prices will rise, which, together with increases in traffic congestion, will cause some drivers to shift to the MBTA. Higher parking demand will precipitate some increases in supply beyond those assumed in the analysis of Chapter 3.

However, there are real constraints to both increasing parking supply and decreasing parking demand by carrying more people on the MBTA. With new parking garages costing at least $15,000 per space, a sum of $105 million would be required to build enough parking to relieve the projected 1985 deficit. Across the country, cities are finding developers less and less willing to build parking because of high construction costs and interest rates. Boston is no exception. Boston's ability to accommodate more parking is also severely constrained by the capacity of its street and highway system. This is a major motivation for the freeze on public off-street parking. Some major proposed highway projects such as the reconstruction of the Southeast Expressway will put increased pressure on the remaining street capacity during the construction period. Further deterioration of traffic conditions in Boston could prove to be as significant a deterrent to further development as a shortage of parking. Also, many vehicles destined for the downtown approach via the Back Bay or South End, where access is through residential areas where increased traffic is undesirable and unwelcome.

On the demand side, the MBTA's ability to handle significant numbers of new riders in the peak is uncertain at best, particularly in the short term. Further, the MBTA is not a convenient option for many. Transit access to the downtown is limited to major radial routes, and crosstown transit access to the downtown area is almost non-existent.

Given these constraints, it is likely that in the absence of definite action on the part of the City, the parking situation could have a detrimental effect on future development, and could precipitate an "exodus" of downtown employers and businesses to fringe or suburban locations.

It is also likely that short-term parkers would be most affected by the deficits, as they typically arrive after commuters do. This would have adverse impacts on retailers such as those in the Back Bay and could decrease the economic vitality of the downtown.

This chapter provides a discussion of the options available to the City for preventing the negative impacts of an imbalance of parking supply and demand. These potential impacts include recruiting difficulties for downtown employers, discouragement of development, a decrease in the number of shoppers and visitors to the downtown, and increased illegal and "spillover" parking on neighborhood streets. Options are presented for addressing the following set of goals:

1. Support continued downtown development.
2. Prevent a significant further deterioration of traffic and parking availability conditions.
3. Protect Boston's neighborhoods from excessive traffic through neighborhoods and "spillover" parking.
4. Ensure that parking is available to those arriving downtown in the midday.

Achieving these goals will require a combination of strategies aimed at increasing parking supply, reducing parking demand, and managing the system to improve efficiency and insure a balanced use of parking resources by commuters, shoppers, residents, and other visitors to the downtown.

4.2 Options for Increasing Supply

Efforts are presently underway to increase the (legal) on-street parking supply in Boston (as discussed in Chapter 2). While this will increase the availability of parking for visitors and shoppers, its likely impact will be to shift those currently parking illegally on-street into legal spaces. Thus, it will not reduce the overall projected parking deficit. However, the City should continue to identify new locations for additional parking meters over the next 5-10 years. An estimated 2,000 additional locations is a reasonable target. This, combined with continued enforcement of on-street regulations will increase parking availability for shoppers and visitors, and alleviate some of Boston's traffic and safety problems which are associated with illegal parking.

Increases in off-street parking beyond those incorporated in the future parking supply projections may occur, but will be constrained by (1) the high cost of garage construction ($15,000-$20,000 per space), and (2) the Boston Air Pollution Control Commission (BAPCC) freeze on the number of public parking spaces in Boston Proper.

Table 4.1 displays current proposals for new off-street parking facilities which have not yet been approved (or in some cases, submitted for approval) by the BAPCC, and were not included in the supply projections of Chapter 2. A total of 4,480 additional spaces have been proposed, including 1,700 at South Station, 1,100 at North Station, 800 through an expansion of the Prudential Garage, 400 as part of developments in Zone 5, and 480 VIP parking spaces accessory to developments in Zones 1, 5 and 11. It should be noted that these are all tentative plans, and that the majority of spaces would not be constructed in the short term (before 1986).

In addition to those facilities listed in the table, there are other opportunities for increasing the parking supply--for example, it is possible to double the size of the Under-Common garage, adding another 1,500 spaces. An addition to the Cheri garage adjacent to the Hynes Auditorium has also been under consideration, in conjunction with the Hynes expansion. While there are few available parcels for garage development in the zones where the greatest parking deficits will occur, parcels could be made available through demolition of buildings or use of existing parking lots. However, present market rates for off-street parking are not sufficiently high to make new garage construction financially feasible, and it is therefore unlikely that substantial new construction will occur in the near future.

Even if the economics of parking facility construction were to change, increases in parking supply must be evaluated with respect to their potential traffic impacts. The downtown street system is, for the most part,

Table 4.1

Future Parking Facility Proposals

(Not Yet Approved by the BAPCC)

Zone	Reserved (VIP) Parking	Public/Unspecified Parking[1]	Total
1	120	1700[2]	1820
3		1100[3]	1100
5	60	400	460
7		800[4]	800
11	300		300
TOTAL	480	4000	4480

Source: Boston Redevelopment Authority

[1] The split between public and private (reserved) spaces has not yet been determined.

[2] Facility to be part of the South Station development

[3] Facility to be part of the North Station development

[4] Proposed Prudential garage expansion

operating under highly congested conditions during peak hours, as are major access routes into Boston. Providing additional parking downtown--particularly for commuters, who travel during peak periods--could worsen Boston's already severe congestion problems. The line of cars waiting to get into the Post Office Square garage each morning is a prime example of localized congestion which can be caused by large downtown parking facilities. Even facilities with adequate access add to overall traffic coming downtown, which has adverse affects on the close-in neighborhoods such as the Back Bay and South End, whose residential streets serve as access routes to the downtown.

The philosophy of the City over the past ten years has been to keep the public parking supply relatively constant and accommodate increased peak period travel on the MBTA. This philosophy is embodied in the BAPCC's parking freeze, which limits the total number of public parking spaces in Boston Proper to 35,503, and requires that all new public facilities meet a set of criteria including "the facility will not contribute significantly to peak period traffic."[1]

The projected 1985 public parking supply of 32,957 spaces in Boston Proper[2] is 2,546 spaces less than the freeze lid of 35,503.[3] Of the 2,546 potential new public spaces, approximately 690 may be allocated to existing open public parking lots to allow them to expand their official capacities to reflect the number of cars they actually park.[4] This leaves only 1,856 "potential" new public spaces--less than one-half of the 4,000 public/unspecified spaces which have been proposed (see Table 4.1).

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[1] See Appendix D for additional background on the freeze.

[2] See Table 3.15. Zone 12 with 3496 public spaces is not included in the freeze area.

[3] The official freeze "balance" as of March, 1983 was 610 spaces, considerably less than the 2,546 spaces indicated here. This discrepancy is due to two factors: (a) some facilities have been or will be replaced by development, but have not yet been added to the bank, (b) the inventory conducted for this study discovered differences in capacities and public/private classifications from past inventories on which freeze records are based.

[4] The 1982 parking inventory showed that the difference between peak utilization and official licensed capacities of public lots in Boston Proper was 689 spaces.

While it is desirable to maintain the parking freeze mechanism to ensure continued control over the number and location of spaces in Boston, expansion of the overall lid merits serious consideration. If the freeze remains unchanged, proposed new spaces may not be constructed, or alternatively, they will be constructed and reserved for employees, or visitors to particular establishments, as private (reserved) spaces are exempt from the freeze.

The development of One Post Office Square illustrates the latter dynamic. Original parking plans for this development included 200 public and 200 private spaces. However, when the application for the 200 public spaces was made to the BAPCC, only 82 spaces were available in the bank. Subsequently, the developer chose to convert the remainder of the requested freeze spaces into private (employee) spaces.[1]

While reserved parking spaces are generally considered important for attracting tenants to new developments, from the City's perspective it is important to ensure parking availability for the general public. Three options are available to the City for encouraging increases in public supply: (1) relaxing the freeze lid, (2) allowing "conversion" of private spaces to public spaces, and (3) establishing minimum public parking requirements for new developments based on square footage.

The first option would be a prerequisite to the other two given the present freeze bank "balance". As the reasons behind the freeze--limiting parking lot blight, traffic, and air pollution--are still valid, it would not be desirable to abolish it altogether. Alternatively, the lid could be expanded to allow new parking construction in areas where no significant traffic impacts would result. Proposed facilities at North and South stations could meet criteria, as they are in close proximity to the expressway system. In fact, larger-than proposed facilities could be constructed in these two locations. Assuming that only minor improvements to the Central Artery are made, up to 1500 spaces could be provided at North Station. While the current roadway system serving the South Station area could only support an additional 500 spaces, a facility designed with a direct link to the expressway would allow an additional 2500 spaces, or a total of 3000.

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[1] Boston Redevelopment Authority, "Downtown Boston Parking Programs," July 1981, pp.66-67.

The lid could also be expanded to allow new facilities which open after 10:00 a.m., and thus serve primarily those travelling in off-peak hours. In Chapter 5, specific modifications to the parking freeze are recommended to allow expansion of the public parking supply while keeping downtown traffic problems in check.

The second option, allowing "conversion" of private (reserved) spaces to public spaces would not accomplish an overall increase in supply, but would increase parking availability to the general public--particularly in light of the fact that peak occupancies of private facilities are considerably lower than those of parking facilities. It is likely that several owners of parking facilities which are presently reserved for private use would seek approval to open their facilities to the public for a fee, if allowed to do so under the freeze. Institution of parking fees would also have the effect of reducing parking demand (See section 4.4). Chapter 5 presents a recommended freeze modification for this option.

The third option, establishing minimum public parking requirements for new developments is a common practice of cities across the country. In fact, prior to the Boston Transportation Planning Review (BTPR) in the early Seventies, Boston's zoning code not only had minimum parking requirements, but provided floor area bonuses to developers who exceeded these requirements. The purpose of minimum requirements was to ensure that the parking needs of new development were met and to prevent spillover parking on the street. The requirements were abolished in Boston in 1973 as part of the zoning code revisions which established a restricted parking district.

Because of Boston's limited traffic capacity, and the relatively good public transit access to most of the downtown, a return to the minimum parking requirements approach is not recommended. However, an approach which ties parking demand reduction measures to development approvals is discussed in section 4.4.

4.3 Options for Better Managing the Supply

Given both the large projected parking deficits in Boston, and the high cost and traffic implications of building enough parking to satisfy the future demand,it will be important to manage the existing parking supply in order to get maximum use from it and to ensure a balanced use of parking resources by short-term parkers (e.g. shoppers) and all-day parkers.

Increasing the Capacity of Existing Facilities. Two relatively low-cost strategies for making better use of parking facilities are: striping with reduced aisle widths and stall sizes, and "attendant park operations".

Striping. In 1978, compact and subcompact cars accounted for over one-third of US automobile sales. In light of the trend toward smaller cars, a number of cities have begun to revise their parking standards accordingly, and many new parking facilities have been striped with a portion of spaces for compacts. A recent survey in Center City, Philadelphia[1] found that 28 percent of the cars in downtown parking facilities were compacts, and could easily fit in an 8' by 16' stall, while most stalls were 10' by 20'.

Depending on the size and configuration of the facility, restriping can increase the capacity by 10 to 25 percent. Thus, restriping the Under-Common Garage, the Winthrop Square Garage, and the Post Office Square Garage (the facilities over which the City has some control; others are likely to be sold) could yield an additional 335 to 838 spaces.

Attendant Park Operations. A commonly employed method of fitting more cars into a parking facility is having an attendant park and unpark cars, reducing the need for large aisles and maneuvering space. Attendant park operations are particularly well suited to facilities which cater to all-day parkers, both because these kinds of users find it more acceptable than short-term parkers, and because less shuffling of cars is required when turnover is low. Thus, operators of both existing and new private employee parking facilities would be the logical implementers of this strategy.

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[1] Philadelphia City Planning Commision, "The Trend Toward Compact Cars: An Evaluation of Parking Standards", May, 1980.

As with restriping, the capacity gains from attendant parking vary from facility to facility, but typically at least a 20 percent increase can be expected. If private facilities accounting for 10 percent of the employee parking supply (1400 spaces) went to attendant park operations, an additional 280 spaces could be gained. However, it must be recognized that attendant parking facilities may generate some additional air pollution due to the need to move vehicles around within the facility. Guidelines for both restriping and attendant park operations are provided in Appendix E of this report.

Ensuring a Balanced Use of Parking Resources. Because of the "first come, first served" nature of parking facilities, ensuring availability of parking for people arriving in the middle of the day requires deliberate management strategies when there aren't enough parking spaces to go around. A number of strategies are commonly used for this purpose:

- restricting the number of spaces which are rented on a monthly basis.
- setting parking rates which are low for the first three to four hours and prohibitively high for eight hours or over.
- opening facilities after most commuters have arrived, at 9:30-10:00 AM.
- eliminating "early bird" rates for commuters.
- reserving spaces for customers or visitors to particular establishments.
- requiring that upper garage levels be filled first.

The projections of future additional parking demand in Chapter 3 indicated increases in non-work related (typically short-term) peak parking demand of 3693 spaces by 1985 and 7501 spaces by 1990. Because the projected work-related parking demand exceeds the projected increases in supply, it is likely that in the absence of steps to reserve a portion of the parking supply for short-term users, commuters would occupy all new spaces, leaving no available spaces in the middle of the day. Seventy-five percent of the additional work-related parking demand generated by development between 1982 and 1985 would be accommodated, as compared with none of the short-term parking demand.

With the exception of the fourth strategy listed above, efforts to reserve space for midday parkers in Boston have been limited to date. While it would seem logical for parking facility operators to maximize turnover in order to realize higher profits, and therefore avoid filling their facilities with all-day parkers, in practice, this does not occur. Commuter parkers are a stable and reliable market, requiring less administrative effort to handle than short-term parkers. For this reason, many facilities cater to the commuter market by offering low monthly and daily rates.

Thus, public sector involvement is typically required to successfully achieve the goal of midday parking availability. In Boston, there are two avenues for public intervention in this regard: reservation of midday space or rate structure changes in publicly controlled facilities (Winthrop Square, Post Office Square, and the Boston Common Garage),[1] and changes to the parking freeze criteria and procedures which provide incentives for private operators or developers of parking facilities to implement the above strategies.

The Post Office Square, Winthrop Square, and Boston Common Garages all have rates considerably lower than the average: one hour rates in these three facilities are $1.75, $1.15, and $0.75 respectively, as compared to the average of $1.92. All day rates are $3.50, $3.40 and $3.00 respectively, as compared to the average of $5.16. These low all-day rates make these facilities attractive to all day parkers, and they are typically full at midday. Increases in the all-day rates or reservation of portions of these facilities until 10 AM are strategies which merit consideration.

Changes to the procedures and criteria of the parking freeze could be an effective means of "reserving" space for short-term parkers in new public parking facilities (including existing facilities which undergo a change in status from private to public). While the present freeze criteria state that new public facilities should not significantly contribute to peak period traffic, there is no explicit criterion stating that facilities should serve short-term parking needs. The inventory information and future parking demand projections developed in this study should provide the BAPCC with sufficient information to determine the extent to which short-term parking needs in different parts of Boston Proper are being met, and negotiate the use of the above parking management strategies with freeze permit applicants as appropriate. The addition of a short-term parking needs criterion is recommended in Chapter 5.

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[1] Both Winthrop Square and Post Office Square are under long-term leases and the Boston Common Garage is under the jurisdiction of Massachusetts Convention Center Authority.

A second change which was referred to in the earlier discussion of options for increasing parking supply is the creation of a special parking space bank to be allocated for facilities open to short-term parkers only. This means that the number of public spaces in the freeze area could exceed the existing lid of 35,503, under the condition that they would not be available for use by commuters. Establishment of a bank for these additional spaces, is necessary in order to prevent parking blight or an oversupply of spaces--two important aspects of the freeze. The number of spaces in this special short-term parking bank could either be set based on the projected needs, or tied to the elimination of private parking spaces, which are not subject to the freeze.

Under the latter scheme, as private spaces were physically eliminated (for whatever reason), an equivalent number of spaces would be deposited into the short-term parking bank, which could then be allocated to new facilities. In order to prevent the "laundering" of short-term spaces under this scheme, only those private parking spaces existing at the time of the change should be allowed to be deposited into the short-term bank upon elimination. Because this scheme would tie increases in public, short-term parking spaces to decreases in private spaces, it provides a logical alternative "metering device" to basing the size of the new bank on projected needs, which are subject to change as development plans become finalized.

4.4 Options for Reducing the Need for Parking

As stated earlier, the parking deficits projected in Chapter 3 assume that in 1985 and 1990, the same percentage of trips to Boston will be by automobile as today, and that the average number of people per car coming into Boston will remain the same. In fact, future travel patterns will depend on a variety of factors:

- future MBTA service levels and fares
- availability and public awareness of alternative commuting options, such as carpooling, vanpooling, and subscription bus services
- the extent of congestion on access routes to Boston
- the availability and cost of downtown parking
- changes in the proportion of downtown workers and shoppers who live in Boston

Increased congestion, higher parking costs, and a constrained parking supply are highly effective disincentives to driving downtown. However, they could potentially drive people away from the downtown at the same time, and discourage continued downtown development. Further, a deterioration in downtown traffic and parking conditions affects the quality of life for downtown residents, which discourages the kind of residential location patterns which could contribute to the success of downtown development. Accommodating new development will require more positive and deliberate steps to encourage greater efficiencies in the way people travel downtown.

While some of the above factors are "exogenous", that is, difficult or impossible to control through public policy, there are steps the City can take, with the help of the private sector to encourage greater efficiencies in the way people travel downtown.

Encouraging the Elimination of Free and Subsidized Parking for Employee. A number of studies have shown that employer-provided free parking is an extremely important incentive for commuters to drive alone to work, rather than using transit or ridesharing. One of these studies[1] estimates that approximately 20 percent of those who now drive alone and receive free parking would form carpools or begin using transit to work if required to pay for parking. Applying this figure to the Boston situation (assuming 50 percent of those parking in the 13,400 reserved employee parking spaces in Boston do so for free), overall demand for parking would be reduced by between 440 and 1300 spaces.[1]

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[1] Shoup, Donald, and Pickrell, D. "Free Parking as a Transportation Problem", DOT-RSPA-DPB-50/80/16, October, 1980.

The proposed parking freeze modification discussed in Section 4.3 which would allow conversion of private employee parking spaces to public (for a fee) spaces is supportive of this strategy, and provides an important mechanism for its implementation.

Ridesharing, Transit Use, and the Development of New Commuter Services. Since the Arab oil embargo and ensuing gas crisis in the early seventies, a number of cities across the country have been promoting and developing ridesharing (carpooling and vanpooling) programs. Nearly ten years of experience has yielded some important lessons regarding effective ridesharing promotion:

- New employees are more likely to respond to ridesharing opportunities than those with already-established commuting habits.
- Employees are much more likely to respond to ridesharing and transit incentives and assistance offered by their employers than to assistance offered by an areawide ridesharing agency operating independently of employers.
- Personalized assistance and the tailoring of ridesharing options to the needs of specific employers and employees (e.g. offering a "straggler" van available to those working late) are important aspects of successful programs.

Given these lessons, and the recent emphasis on encouraging public/private partnerships, two related developments have emerged over the past few years. Cities such as San Francisco, Seattle, Los Angeles, and a handful of others have come to view organized ridesharing efforts as important mechanisms for reducing the traffic and parking impacts of new development. These cities have begun to "institutionalize" this idea, negotiating with developers and/or their major tenants to commit to actions which will encourage ridesharing and transit use by employees. Cities with minimum parking requirements (e.g. Los Angeles) allow developers to build less than the required number of spaces in exchange for these commitments. Cities without downtown parking requirements (e.g. San Francisco) make development approval conditional on an acceptable plan of "traffic mitigation measures".

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[1] The low estimate assumes all 20 percent would shift to carpools; the high estimate assumes all would shift to transit.

The other related development is the formation of public/private "transportation management organizations". These organizations involve members of the corporate and retail communities and of public sector transportation agencies and departments who work cooperatively to define transportation problems and develop comprehensive strategies for solving them. Hartford, Connecticut's transportation management organization, for example, is working to phase out employer-provided free parking, phase in employer transit pass subsidies, establish fringe parking lots with shuttle buses, and encourage employer ridesharing incentives.

Both of these developments offer models of strong, positive steps which the City of Boston could pursue in order to reduce its future parking needs and keep traffic congestion in check. Both public sector ridesharing promotion and private sector involvement in employee transportation issues have been very limited in Boston to date, to a large extent because the MBTA has been relied upon as the major commuter alternative to driving alone. While the MBTA will have to serve a growing number of trips to the downtown, and play a crucial role in relieving the parking deficit, it will be important to develop and promote a range of commuting alternatives (carpools, vanpools, subscription bus services) in order to adequately provide for the access needs of future development. The most effective way of doing this is to ensure that new developments incorporate both physical facilities (e.g. transit information booths, car and vanpool parking spaces) and programatic mechanisms (e.g. transit pass subsidies, in-house ridesharing coordinators) which encourage ridesharing and transit use.

While the effectiveness of these strategies are difficult to predict, the following reasonable goals could be set for the next eight years:

- formation of 150 vanpools (Aetna in Hartford alone has 100). This would reduce parking demand by 1950 spaces.
- formation of 150 three-person carpools. This would reduce parking demand by 300 spaces.
- an increase in MBTA and private bus (including new subscription services) ridership of 11,000 persons. This would reduce parking demand by 11,000 spaces.

Parking space reductions associated with these goals assume that all persons involved would otherwise be driving alone to work. In fact, this is not what would occur--shifts would be made from carpools to transit, and from transit to carpools as well as from the drive-alone mode to transit and carpools. For the sake of simplicity, goals are stated in the above fashion. It should be noted, however, that increases in carpool, vanpool and transit use would have to be at least as high as those stated above for the estimated parking demand reductions to be achieved. It should also be noted that the demand reduction estimated earlier for institution of employer parking charges would be included, not in addition to the above parking demand reduction of 13,250 spaces.

The target parking demand reduction of 13,250 spaces should be established as a goal for both access planning and the activities of the transportation management organization. As new employees will account for slightly under one third of the 1990 workforce, two thirds of this reduction should be targeted to be achieved by modal shifts on the part of existing employees, and 33 percent to be achieved by actions on the part of developers and future tenants to increase transit and ridesharing by new employees beyond the "status quo" proportions. Table 4.2 presents status quo and target travel patterns for new employees.

Figure 4.1 presents an outline of how an access plan for a new development should be structured, and provides a list of traffic mitigation measures which developers and/or tenants could choose from.

Figure 4.2 presents a list of agenda items relevant for consideration by a Boston transportation management organization.

Table 4.2

Status Quo and Target Travel Patterns for Work Trips Generated by New Development

	Status Quo	Target
Total Work Trips	69,502	69,502
Auto Person-Trips	28,030 (40%)	24,400 (35%)
single-occupant	11,801	7,321
carpool/vanpool	16,229	17,079
Vehicle Trips	18,563	14,184
single-occupant	11,801	7,321
carpool/vanpool	6,762	6,863
Average Auto Occupancy	1.51	1.72

Assumptions: Status quo mode split and auto occupancy as described in Appendix C; carpool/vanpool occupancy of 2.4 assumed for status quo = national average; target calculated by applying one-third of full target reduction (of 13,250 spaces), of shifts of 3,600 status-quo "drive alone" trips to transit, 700 to form 50 14-person vanpools, and 339 to form 50 3-person carpools.

Figure 4.1

Access Plan Requirements

1. Projections of future commuter and non-commuter daily person-trips to the site, assuming full occupancy. These projections should be based on the expected number of employees (if known) and/or standard trip generation rates.

2. An estimate of the number of daily non-commute trips which will be made by automobiles (or other motor vehicles), and the number of parking spaces required to accommodate these trips.

3. A plan for how the non-commuter parking demand will be met through (a) on-street parking, (b) accessory off-street parking to the site, (c) and other off-street facilities.

4. Targets for (a) the number of daily commute trips to the site which will be made in automobiles and (b) the average occupancy of vehicles coming to the site. Minimum required targets are: 35 percent of total commuter person-trips in automobiles, and an average auto occupancy of 1.72 persons per auto. Exceptions to these minimum targets will be made if a set of targets which would result in the same commuter parking demand are set.

5. A list of "traffic mitigation measures" (see attached) for achieving the chosen targets which the developer will be responsible for implementing.

6. A commitment to conduct employee travel surveys on an annual basis to determine the number of employees who: drive alone, carpool, vanpool, use transit, and use other means of transportation to work (e.g. walk, bicycle), and submit the results of such surveys to the BRA.

7. A commitment to submit a revised plan of mitigation measures within 60 days of a travel survey finding that the targets set are not being met.

Traffic Mitigation Measures

*1. Hire or designate a transportation coordinator to be responsible for distribution of transit and ridesharing information to employees, distributing transit passes, conducting periodic surveys of employee commute patterns, and developing incentives to encourage greater use of high-occupancy commute modes.

2. Offer carpool/vanpool matching services to all employees, either "inhouse", or in coordination with Caravan.

3. Investigate and implement a company-sponsored (or building manager-sponsored) vanpool program.

Figure 4.1 (Cont'd)

3a. Subsidize the cost of the vanpool program.

4. Investigate and implement a subscription bus service.

5. Investigate and implement a work schedule policy aimed at spreading out peak traffic destined to the site (staggered hours, flexible hours, or the compressed work week).

6. Establish a transit information booth or display in a lobby or other central location.

7. Provide partial or full subsidies for MBTA passes.

8. Establish a policy of no subsidized employee parking.

9. Set aside a portion of accessory parking spaces (if applicable) for car or vanpool parking in convenient locations.

10. Provide free or subsidized parking for car and vanpools.

11. Provide showers and lockers for bicyclists.

12. Include a physical linkage to nearby MBTA stations in the building design (if applicable).

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* Required measure for all plans

Figure 4.2

Transportation Management Organization Agenda

1. Define and achieve consensus on the major transportation concerns of downtown employers and retail establishments. These may include: parking, traffic, downtown circulation needs, improving access to the downtown for particular types of employees, loading and goods movement, etc.

2. Collection information on employee commute patterns, assess the potential market for carpooling, vanpooling, and new subscription bus services.

3. Adopt a set of target modal shares for commute trips into the downtown, and define strategies for achieving them.

4. Work with the MBTA and Caravan to develop new ridesharing and transit services and improve existing ones.

5. Collect information on employee transportation services or benefits now offered by downtown employers, and make this information available to interested employers.

6. Promote and provide assistance for establishing flexible or staggered work schedule policies in order to relieve downtown congestion problems.

7. Identify and pursue joint-use opportunities for private parking facilities.

5.0 Recommended Actions

Based on the assessment of present parking conditions and future needs, a series of discussions were held, involving representatives of the Boston Traffic and Parking Department, the Mayor's Office, the Boston Redevelopment Authority, and the Boston Air Pollution Control Commission. During the course of these discussions, the policy options presented in the previous chapter were developed, and a set of recommended actions were agreed upon. Many of these discussions focussed on formulating a package of modifications to the parking freeze, as the freeze represents one of the City's most effective parking policy tools. A background paper on the freeze was prepared, which summarizes its impacts to date, and recommends and analyzes the potential impacts of a series of modifications, most of which were discussed in Chapter 4. This paper is provided as Appendix D of this report. This chapter summarizes the full set of recommended actions, according to their contributions to (1) increasing the supply of parking--both public and private, (2) reserving parking space for short-term parkers arriving downtown in the midday, and (3) reducing the demand for long-term parking.

5.1 Increasing Supply

The following steps are recommended for increasing Boston's parking supply:

	No. of Spaces
1. Approve remaining spaces in the freeze bank	2546(public)
2. Encourage construction of a 3000 space facility at South Station directly linked to the expressway	3000(public)
3. Encourage construction of a 1500 space facility at North Station	1500(public)
4. Restripe major public facilities with reduced aisle width and compact car spaces	838(public)
5. Grant exemptions for proposed private spaces	480(private)
6. Encourage attendant parking in private facilities	335(private)
Total Public Supply Increase	7884
Total Private Supply Increase	815
Total Public and Private Supply Increase	8699

5.2 Ensuring Midday Parking Availability

The following steps are recommended to ensure availability of parking in the future for those arriving downtown in the midday:

	No. Spaces Reserved
1. Modify rate structures at the Post Office Square, Winthrop Square, and Boston Common Garages so that the all-day rate is eight times the hourly rate, OR, reserve one-third of the spaces in these facilities for midday parkers by opening them after 10 am.	1106
2. Expand the freeze bank to include a "midday parking bank" starting January 1, 1984. Spaces would be added to this bank as existing private employee spaces are physically eliminated. Spaces in this bank would be allocated for new facilities on the condition that they would not open before 10 am on weekday mornings.	1400
3. Add to the existing freeze criteria: "The facility will serve non-commuter parking needs in the area".	2700
4. Identify new meter locations and continue agressive on-street enforcement.	2000
Total Number of Spaces Reserved for Midday Use	7206

5.3 Reducing Parking Demand

The following steps are recommended to reduce commuter parking demand by encouraging greater efficiencies in travel to the downtown and removing major incentives for driving alone:

1. Require access plans for new developments incorporating appropriate transit, ridesharing, and employee transportation subsidy policies which do not provide an incentive for drive-alone commuting.

2. Establish a joint public/private sector transportation management organization in Boston to develop and make available new high-occupancy means of commuting to the downtown and organize coordinated ridesharing incentive programs among downtown employers.

3. Allow existing freeze-exempt employee spaces (which have been granted exemptions by December 31, 1983) to be opened to the public for a fee and expand the freeze bank accordingly.

The combination of the above strategies and exogenous factors such as increased traffic congestion and high parking costs are targeted to reduce commuter parking demand by 13,250 spaces.(See section 4.4)

5.4 Summary

The recommended set of strategies would have the following impacts:

- An increase in total parking supply of 8,699 spaces.
- A reduction in long-term parking demand by 13,250 spaces.
- Reservation of up to 7,206 spaces for midday parkers.

Combining the estimated supply increase and demand reduction, the projected 1990 parking deficit of 22,632 would be reduced by 21,949 spaces. The balance of 683 spaces is quite small, and could be eliminated if greater proportions of downtown workers and shoppers are also downtown residents in the future.

Because 7,206 spaces would be reserved for midday use, the net increase in parking supply which would be available for commuter parkers would amount to only 1,493 spaces. Major increases in parking supply available to commuters would occur only at North and South Stations, where street capacity would be adequate to handle increases in peak period trips, while decreases in parking availability for commuters would occur in other portions of the study area.

Appendix A

1982 Parking Inventory

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 1-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
69				(69)	-	-	-	-	A
94				174	143	143	-	-	B
97			184		92	111	3.00	6.00	
98		10			7	9	-	-	
99	14				21	23	2.00	5.00	
107	60				87	95	2.00	5.00	
108	45				68	72	2.00	6.50	
109			650		585	585	2.00	5.00	B
110		15			19	19	-	-	
111			82	318	262	276	3.00	12.00	
112	30				21	29	2.00	6.75	
113	54				44	47	2.00	7.00	
114			100		125	129	3.00	7.00	C
115	15				11	13	2.00	7.00	
116	21				10	18	3.75	7.50	
117			400		289	411	2.00	5.75	D,E
118	19				21	17	4.00	7.00	
119				(93)	-	-	-	-	A
120			950		936	941	1.75	3.50	
121a	35				30	33	4.00	8.00	
121b	30				27	25	3.00	7.50	
121c	60				79	89	2.00	7.00	
122			200		167	190	2.50	12.50	
123a		40			49	46	-	-	
123b		16			18	21	-	-	
123c		16			10	11	-	-	
124		15			4	3	-	-	
125	97				53	56	2.00	7.00	
126a		40			15	11	-	-	
126b		45			11	9	-	-	
127	220				215	251	2.00	5.00	
128	54				40	53	NA	NA	

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 1-A (continued)

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
129				20	23	20	-	-	
129a		24			12	13	-	-	
131				163	109	130	-	-	
132			335		107	230	3.00	8.00	
133			900		852	919	1.15	3.40	D
134	85				124	116	4.50	10.00	
135				240	220	245	-	-	
136				99	92	92	-	-	B
141		(43)			-	-	-	-	A
142	13				15	14	2.50	8.00	
TOTAL	(16) 852	(9) 221	(8) 3801	(6) 1014	5013	5515			

ZONE 1-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
159			350		353	398	2.50	6.00	E
160	45				48	42	2.00	6.00	
161		75			87	62	-	-	C
205	105				138	117	2.00	5.00	C,D
206	68				71	64	3.00	6.00	
207		68			141	138	-	-	C
208		12			14	13	-	-	
209	(189)				-	-	-	-	A
210		90			157	169	-	-	C
316				147	-	-	-	-	F
TOTAL	(3) 218	(4) 245	(1) 350	(1) 147	1009	1003			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 2-A

Index No.	Rated Capacity Public Lot	Rated Capacity Private Lot	Rated Capacity Public Garage	Private Garage	Observation 10 AM-11 AM	Observation 12 Noon-1 PM	Rates (Public Facilities Only) 1 Hour Rate	Rates (Public Facilities Only) 8 Hour Rate	Notes
55a	65				14	24	NA	NA	
55b	142				81	109	NA	NA	
56		14			13	13	-	-	
57			1865		1731	1881	2.00	4.00	G
58		19			10	7	-	-	
59		300			353	358	-	-	
60				180	181	186	-	-	
61a				250	250	250	-	-	B
61b				482	432	396	-	-	
62		107			53	55	-	-	
63	26				21	20	3.75	11.00	
64	38				32	30	5.00	10.00	
65	40				26	34	5.00	10.00	
66			580		440	428	3.00	12.00	E
67			150		119	196	3.00	12.00	
68			600		442	526	4.00	10.00	H
70a				60	100	102	-	-	
70b				28	19	19	-	-	I
71a				180	174	174	-	-	B
71b		23			31	27	-	-	
72		17			18	15	-	-	
73		10			5	8	-	-	
75		150			201	203	-	-	
87			597		596	698	3.00	7.00	
88	179				216	208	1.00	4.00	
93				227	171	184	-	-	
95a	31				24	25	2.00	6.75	
95b	10				13	17	2.00	6.75	
96a	18				15	18	4.00	8.00	
96b	12				31	35	4.00	8.00	
138	31				34	31	3.50	10.00	
139			290		338	430	3.00	7.00	
212		15			23	24	-	-	
TOTAL	(11) 592	(9) 655	(6) 4082	(7) 1407	6207	6731			

OFF-STREET ACCUMULATION

ZONE 2-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
4a		119			70	67	-	-	
4b				278	-	-	-	-	F
5		17			18	21	-	-	
6a	30				30	32	2.00	5.00	
6b				309	209	258	-	-	
7			342		347	307	2.00	5.00	
8a				710	670	670	-	-	J
8b			490		584	589	2.00	3.50	
213		136			45	73	-	-	
214		(16)			-	-	-	-	K
217		35			21	24	-	-	
218a			794		577	602	2.00	6.00	
218b	160				101	132	2.00	8.00	
220		23			17	18	-	-	
221		33			41	39	-	-	L
222			700		582	573	.75	5.25	L
TOTAL	(2) 190	(6) 363	(4) 2326	(3) 1297	3372	3405			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 3-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
9		400			385	378	-	-	
10		75			68	77	-	-	
12	375				295	381	1.50	3.00	
13		75			75	79	-	-	
14		50			50	45	-	-	
11		800			750	806	-	-	
15		27			48	48	-	-	
16	51				51	50	.75	2.00	
17c	28				23	25	NA	NA	
17a	24				14	16	2.00	3.00	
17b	56				37	45	2.00	3.00	
18	71				54	66	2.00	3.00	
19	300				290	311	1.50	3.00	
22	25				33	42	1.50	3.50	
24	92				112	106	2.00	4.00	
25	27				13	25	2.00	5.00	
26	41				22	29	2.00	6.00	
27		12			12	12	-	-	
28	45				70	81	NA	NA	
29		14			8	9	-	-	
30	10				16	14	2.00	6.00	
31a		40			29	32	-	-	
31b		25			1	2	-	-	
-		12			6	5	-	-	M
TOTAL	(13) 1145	(11) 1530	-	-	2462	2684			

OFF-STREET ACCUMULATION

ZONE 4

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM- 11 AM	12 Noon- 1 PM	1 Hour Rate	8 Hour Rate	
223			750		637	656	1.00	7.00	B
215		15			20	18	-	-	B
216		15			9	11	-	-	
225a,c	153				189	195	1.00	4.00	
225b	150				294	296	1.00	4.00	
226		15			12	11	-	-	
227			65		65	65	2.00	5.00	B
228		25			12	11	-	-	
229	30				11	11	NA	NA	
230				18	21	21	-	-	
231				48	27	24	-	-	
232			110		114	110	NA	NA	
TOTAL	(3) 333	(4) 70	(3) 925	(2) 66	1411	1429			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 5-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM- 11 AM	12 Noon- 1 PM	1 Hour Rate	8 Hour Rate	
137			900		779	938	3.00	7.00	E,N
140	69				66	68	3.75	NA	O
140a	15				15	15	3.75	NA	O
143			(1267)		-	-	-	-	A
144			735		269	375	2.00	6.00	E,P
145	56				41	49	3.00	7.00	
146	51				53	50	2.75	6.00	
147	15				8	14	3.00	7.50	
148			350	125	-	-	3.00	7.00	F
149	57				38	71	NA	NA	
150	50				39	39	3.00	7.50	I
152	(64)				-	-	-	-	A
153	15				18	19	2.00	6.00	
154	43				43	52	2.50	6.00	
-		29			29	29	-	-	G,R
TOTAL	(9) 371	(1) 29	(3) 1985	(0) 125	1398	1719			

ZONE 5-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
155	18				12	31	2.00	6.00	
156	47				39	44	3.00	7.00	
157	28				24	30	2.00	6.00	
158a	18				24	30	2.50	6.00	
158b	18				16	20	2.50	6.00	
162	15				9	17	NA	NA	
163	65				31	45	NA	NA	
164			500		330	350	3.00	5.00	
165	50				22	45	2.50	6.00	
166	89				57	73	2.00	7.00	
167			(275)	(100)	-	-	-	-	A
173	95				53	93	4.00	7.00	
174	35				35	43	4.00	4.00	
176				32	30	31	-	-	
195	80				110	102	3.00	3.00	S
196			937		843	822	1.50	3.50	
199				17	5	5	-	-	
200	183				197	185	1.50	NA	
201		16			6	6	-	-	
202		(12)			-	-	-	-	T
203		18			19	21	-	-	
204	70				122	124	1.50	NA	
211		(40)			-	-	-	-	
329				110	103	99	-	-	U
TOTAL	(14) 811	(2) 34	(2) 1437	(3) 159	2087	2216			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 6-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
233			1500		1525	1525	.75	3.00	
TOTAL			1500		1525	1525			

OFF-STREET ACCUMULATION

ZONE 6-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
237		17			12	15	-	-	
238		12			10	11	-	-	
TOTAL	(0) 0	(2) 29	(0) 0	(0) 0	22	26			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 7-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
168	(103)				-	-	-	-	A
169				(57)	-	-	-	-	A
170			900		698	696	2.00	4.00	
177			900		700	705	4.50	4.50	
178	13				19	20	4.00	6.00	
179	17				12	18	NA	NA	
180		15			13	13	-	-	
181	62				55	59	NA	NA	
182	54				98	95	2.00	3.50	
183	84				99	106	3.00	6.00	
184		17			13	14	-	-	
185		22			20	20	-	-	
186		30			23	22	-	-	
187		35			21	27	-	-	
188	52				51	60	3.00	6.00	
189		10			11	13	-	-	
190		16			11	11	-	-	
191		30			25	25	-	-	
192	52				53	54	2.00	6.00	
193	77				94	105	3.00	7.50	
104		100			87	82	-	-	
224				80	-	-	-	-	F
234		11			4	5	-	-	
235				130	87	91	-	-	
236				50	14	12	-	-	
239		41			27	56	-	-	
240a		30			22	17	-	-	
240b		30			24	25	-	-	
241			625		495	519	2.00	6.00	E
242			774	1010	1583	1605	2.00	4.00	E
271				(80)	-	-	-	-	V
-	55				47	47	NA	NA	W
TOTAL	(9) 466	(13) 387	(3) 3199	(4) 1270	4406	4522			

OFF-STREET ACCUMULATION

ZONE 7-B

Index No.	Rated Capacity Public Lot	Private Lot	Public Garage	Private Garage	Observation 10 AM-11 AM	12 Noon-1 PM	Rates (Public Facilities Only) 1 Hour Rate	8 Hour Rate	Notes
244	60				59	65	2.00	6.00	
245	(71)				-	-	-	-	A
247	50				32	60	4.00	10.00	
248	71				40	40	4.00	12.00	
249		14			11	11	-	-	
253	25				15	22	NA	NA	
255			500		191	199	4.00	6.00	
256			(27)		-	-	-	-	V
257		(50)			-	-	-	-	V
259		22			8	18	-	-	
260			501		500	506	2.00	5.00	
261				(265)	-	-	-	-	A
262a,b,c,d			2067	220	2228	2193	1.50	6.50	E
276				(275)	-	-	-	-	A
TOTAL	(4) 206	(2) 36	(3) 3068	(0) 220	3184	3214			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 8

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM- 11 AM	12 Noon- 1 PM	1 Hour Rate	8 Hour Rate	
246				20	5	6	-	-	B
250		18			12	7	-	-	
251		11			24	23	-	-	
252				72	44	42	-	-	
254		32			33	31	-	-	
TOTAL		(3) 61		(2) 92	118	109			

OFF-STREET ACCUMULATION

ZONE 9-A

Index No.	Rated Capacity Public Lot	Rated Capacity Private Lot	Rated Capacity Public Garage	Rated Capacity Private Garage	Observation 10 AM-11 AM	Observation 12 Noon-1 PM	Rates (Public Facilities Only) 1 Hour Rate	Rates (Public Facilities Only) 8 Hour Rate	Notes
263				550	444	447	-	-	
264				145	78	75	-	-	
265				(210)	-	-	-	-	A
266			275		103	106	1.50	6.00	
267				20	21	22	-	-	
268				28	20	43	-	-	
269		18			29	29	-	-	
276			(860)		-	-	-	-	A
TOTAL	(0) 0	(1) 18	(1) 275	(4) 743	695	722			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 9-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
270		38			23	21	-	-	
272a,c	47				58	59	NA	NA	
272b	23				22	20	NA	NA	
272d	61				61	59	2.00	5.00	
272e	68				61	50	2.00	5.00	
273		28			20	19	-	-	
274		76			50	50	-	-	
275		(58)			-	-	-	-	V
277a		94			95	100	-	-	
277b		75			55	58	-	-	
277c		75			58	62	-	-	
278				410	316	312	-	-	
279		(56)			-	-	-	-	A
280	(70)				-	-	-	-	A
281		17			4	3	-	-	
282		10			15	15	-	-	
283b		16			20	20	-	-	
283a		10			5	5	-	-	
285		38			11	11	-	-	
287		20			0	0	-	-	
288	159				145	141	1.00	2.50	
289		28			23	23	-	-	
292&293		95			70	70	-	-	
294		51			45	43	-	-	
296		39			48	46	-	-	
304		55			19	19	-	-	
343			394		394	394	NA	NA	
VHA-1		14			14	14	-	-	B
VHA-2	54				50	54	1.00	4.50	X B,Y
TOTAL	(6) 412	(18) 779	(1) 394	(1) 410	1682	1668			

ZONE 10

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
290		49			11	13	-	-	
291		72			43	40	-	-	
297			(20)	(20)	-	-	-	-	V
299		(44)			-	-	-	-	V
300		12			10	10	-	-	
302		30			0	0	-	-	
303		30			8	8	-	-	
305		96			85	86	-	-	
306		21			13	10	-	-	
307		75			29	27	-	-	
308		20			5	7	-	-	
309		44			51	48	-	-	
310		316			263	257	-	-	
312			250		168	171	1.75	5.00	
312a		25			12	12	-	-	
313		90			140	138	-	-	
314		38			0	0	-	-	
315a,b		143			152	148	-	-	
317		20			9	7	-	-	
318		44			30	30	-	-	
320		106			39	43	-	-	
322		35			7	7	-	-	
323		25			25	25	-	-	Q,D,AA
324		75			12	12	-	-	
325		(15)			-	-	-	-	BB
330		10			8	8	-	-	
331		14			8	8	-	-	
332		32			5	7	-	-	
333a		275			161	160	-	-	
333b		15			10	10	-	-	
333c		38			15	15	-	-	
333d		60			25	22	-	-	
334		20			4	4	-	-	

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 10 (continued)

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
335		13			5	5	-	-	
337		20			5	5	-	-	
338		300			268	268	-	-	
338a		1000			991	898	-	-	
339a		500			360	360	-	-	B,CC
339b		44			193	197	-	-	
339c,d&340		122			208	197	-	-	
341		425			308	290	-	-	
342		20			26	28	-	-	
VHA-1		50			40	40	-	-	Q
VHA-2		10			9	8	-	-	Q
VHA-3		45			40	40	-	-	Q
VHA-4		20			16	16	-	-	Q
TOTAL	(0) 0	(42) 4399	(1) 250	(0) 0	3817	3625			

OFF-STREET ACCUMULATION

ZONE 11-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
20		99			84	93	-	-	
21	53				65	94	3.00	3.00	
33	63				19	40	NA	NA	
34		18			98	95	-	-	
35		30			79	85	-	-	
36		18			22	29	-	-	
37		48			51	50	-	-	
38				645	259	259	-	-	I
39	49				42	37	-	-	
41		10			25	23	-	-	
42		445			340	298	-	-	
43		(21)			-	-	-	-	DD
44	90				75	74	1.00	5.00	
45		11			12	15	-	-	
46		17			20	19	-	-	
47		(10)			-	-	-	-	K
48		12			12	12	-	-	
49		15			6	6	-	-	
50		25			15	15	-	-	
51		30			32	29	-	-	
52		20			12	9	-	-	
53		10			15	18	-	-	
54		18			4	4	-	-	
77		(20)			-	-	-	-	A
78		(50)			-	-	-	-	A
79a		59			35	18	-	-	
80		14			34	35	-	-	
81	203				142	175	2.00	7.00	
82		(40)			-	-	-	-	K
83		27			49	45	-	-	
83a		10			10	10	-	-	
84	203				190	198	2.00	5.50	
VHI		20			17	19	-	-	Q,EE
TOTAL	(6) 661	(21) 956	(0) 0	(1) 645	1764	1804			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 11-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
86		100			117	113	-	-	
89				190	110	115	-	-	
91		50			65	70	-	-	
100		(16)			-	-	-	-	K
101		(15)			-	-	-	-	V
102			1150	350	770	869	3.00	7.00	E
103		12			0	0	-	-	
104	73				81	82	2.00	6.00	
105	149				100	112	2.00	6.00	
106	15				21	21	NA	NA	
TOTAL	(3) 237	(3) 162	(1) 1150	(1) 540	1264	1382			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 12-A

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM- 11 AM	12 Noon- 1 PM	1 Hour Rate	8 Hour Rate	
Pr Lots: F(BRA)		80			29	79	-	-	Q
Pr Lots: H(BRA)				110	112	124	-	-	Q
Lic #271: E(BRA)	18				24	28	3.00	4.00	
Lic #117: F(BRA)	34				16	19	NA	NA	FF
Lic #119: G(BRA)	707				617	684	2.00	2.00	
Lic # 43: H(BRA)	1908				1904	1908	1.50	1.50	Q
Lic # __: I(BRA)	(31)				-	-	NA	NA	BB
VH1		100			90	90	-	-	I,Q,GG
VH2		14			8	8	-	-	I,Q,HH
VH3		24			6	6	-	-	I,Q,II
VH4		20			21	21	-	-	I,Q,JJ
VH5		16			4	4	-	-	I,Q,KK
TOTAL	(4) 2667	(6) 254	(0) 0	(1) 110	2831	2971			

BOSTON PARKING SURVEY
OFF-STREET ACCUMULATION

ZONE 12-B

Index No.	Rated Capacity				Observation		Rates (Public Facilities Only)		Notes
	Public Lot	Private Lot	Public Garage	Private Garage	10 AM-11 AM	12 Noon-1 PM	1 Hour Rate	8 Hour Rate	
Pr Lots: A(BRA)		58			58	45	-	-	Q
Pr Lots: B(BRA)		750			630	750	-	-	Q
Pr Lots: C(BRA)		200			175	172	-	-	Q
Pr Lots: D(BRA)		35			16	15	-	-	Q
Pr Lots: E(BRA)		80			90	96	-	-	Q
Pr Lots: G(BRA)		80			18	18	-	-	Q
Pr Lots: I(BRA)		50			47	51	-	-	Q
Lic #113: A(BRA)	50				58	45	-	-	FF
Lic #115: B(BRA)	150				126	115	1.50	2.00	
Lic # 45: C(BRA)	(24)				-	-	NA	NA	LL
Lic #118: D(BRA)	629				802	844	2.00	2.00	
VH6		15			10	10	-	-	I,Q
VH7		40			21	21	-	-	I,Q
TOTAL	(3) 829	(9) 1308	(0) 0	(0) 0	2051	2182			

BOSTON PARKING SURVEY OFF-STREET ACCUMULATION

KEY TO PARKING FACILITY INDEX NUMBERS

Index Number	Name or Address of Facility
4a	395 Charles Street
4b	395 Charles Street
5	Blossom Street
6a	Blossom Street
6b	Emerson Place
7	Hawthorn Place
8a	Martha Road
8b	Martha Road
9	100 Nashua Street
10	65 Nashua Street
11	Nashua Street
12	45 Nashua Street
13	Nashua Street
14	100 Nashua Street
15	66-70 Nashua Street
16	52 Billerica Street
17a	44 Nashua Street
17b	34-40 Nashua Street
17c	24-32 Lomasney Way
18	18-28 Nashua Street
19	36 Accolon Way
21	131 Beverly Street
22	26-28 Lancaster Street
24	160 Portland Street
25	235-239 Friend Street
26	302-320 Friend Street
28	200-204 Friend Street
29	37 Merrimac Street
30	89-91 Canal Street
31a	Haverhill Street
31b	Haverhill Street
33	North Washington Street
34	239 Causeway Street
35	D'Amore Restaurant Parking
36	131 Beverly Street
37	585 Commercial Street
38	598-602 Commercial Street
39	588 Commercial Street
41	70 Charter Street
42	Hanover Street
43	376 North Street
44	350-366 North Street
45	219-223 North Street
46	100-102 Fulton Street
47	111-113 Richmond Street
48	174 North Street
49	133-147 North Street
50	44 Prince Street

51	25 North Bennet Street
52	North Washington Street
53	60 Endicott Street
54	77 Salem Street
55a	15 Cross Street
55b	99 Cross Street
56	Blackstone Street
57	Government Center Garage
58	72-80 Merrimac Street
59	Cambridge Street/MDC Police
60	New Chardon Street
61a	100 Cambridge Street
61b	Bowdoin Street
62	130-140 Bowdoin Street
63	17 Beacon Street
64	12-14 Ashburton Place
65	10 Somerset Street
66	50 Cambridge Street
67	One Beacon Street Garage
68	219-237 Washington Street
70a	City Hall Garage
70b	City Hall Plaza
71a	Cambridge Street
71b	Cambridge Street
72	Alley 102
73	Creek Square
75	New Congress Street
77	New Congress Street
78	379 Commonwealth Street
79a	379 Commercial Street
80	Commercial Street
81	2-8 Atlantic Avenue/Lewis Wharf
82	300 Atlantic Avenue
83	45-63 Atlantic Avenue
84	Sargent's Wharf Parking Lot
86	Commercial Wharf South
87	1-37 Commercial Street
88	Quincy Market Garage
89	Long Wharf Hotel
91	T Wharf
93	60 State Street
94	Federal Street
95a	52-56 Chatham Street
95b	49-51 Chatham Street
96a	57 Chatham Street
96b	Frank's Auto Park
97	Brattle Co. Businessman's Garage
98	51 India Street
99	53-59 India Street
100	India Square
101	Atlantic Avenue
102	65 India Wharf

103	307-315 Atlantic Avenue
104	324-344 Atlantic Avenue
105	354 Atlantic Avenue
106	High Street Parking Facility
107	345 Atlantic Avenue (rear)
108	27-51 Purchase Street
109	Fort Hill Square Garage
110	Wendell Street
111	One Post Office Square Garage
112	5-11 Custom House Street
113	20-163 Custom House Street
114	14-20 Custom House Street
115	22 Custom House Street
116	47-49 Broad Street
118	73-79 State Street
119	53 State Street Garage
120	Post Office Square Garage
121a	30-34 Oliver Street
121b	28 Oliver Street
121c	156-158 High Street
122	142-150 High Street
123a	139-145 High Street
123c	132-140 Pearl Street
124	99-125 Oliver Street
125	55-83 Purchase Street
126a	470 Atlantic Avenue
126b	472 Atlantic Avenue
127	474-476 Atlantic Avenue
128	300 Congress Street
129	Purchase Street
129a	Purchase Street
131	Keystone Building Garage
132	High Street Garage
133	240 Devonshire Street
134	89-107 Federal Street
135	Shawmut Bank Building
136	50 Milk Street Garage
137	Woolworth Garage
138	523 Province Street
139	Province Street Garage
140	Bedford & Kingston
140a	16-18 Kingston Street
141	22-28 High Street
142	Ernie's Parking Lot
143	Lafayette Place Garage
144	Kingston-Bedford Garage
145	Bedford & Chauncy
146	128-130 Essex Street
147	17-21 West Street
148	Tremont-on-the-Common
149	30-50 Mason Street
150	8 Avery Place

152	564-580 Washington Street
153	Boylston & Essex
154	45-47 Boylston Street
155	30-34 Boylston Street
156	33-37 Essex Street
158a	133 Essex Street
158b	130 Kingston Street
159	84-96 Beach Street
160	133-137 Beach Street
161	Kneeland Street
162	22 Edinboro Street
163	17-21 Tyler Street
164	Shopper's Garage
165	47-55 LaGrange Street
166	41-47 Stuart Street
167	State Street Transportation Bldg. Garage
168	182-212 Boylston Street
169	64 Providence Street
170	Motor Mart Garages
173	150 Stuart Street
174	267 Tremont Street
176	Josiah Quincy Elementary School
177	200 Stuart Street
178	222 Stuart Street
179	57-59 Church Street
180	Church Street
181	66-72 Church Street
182	130-132 Arlington Street
183	107-127 Arlington Street
184	Cortes Street
185	174-188 Columbus Avenue
186	40 Isabella Street
187	187 Columbus Avenue
188	206 Columbus Avenue
189	Alley 559
190	380 Stuart Street
191	Stuart Street
192	Stanhope Garage
193	400-406 Stuart Street
195	8-24 Shawmut Avenue
196	274 Tremont Street
199	276-280 Broadway
200	2-7 Eliot Street
201	35 Tyler Street
202	Harvard Street
203	59-61 Hudson Street
204	1 May Place
206	203-213 Essex Street
207	Kneeland Street
208	73-75 South Street
209	655-685 Atlantic Avenue
210	Kneeland Street

211	818-824 Washington Street
212	1-17 Tremont Place
213	Bowdoin Street
214	Temple Street
215	Joy Street
216	200 Cambridge Street
217	Staniford Street
218a,b	Charles River Plaza
220	60 Cardinal O'Connell Way
221	5-7 Bridge Court
222	269-273 Cambridge Street
223	279-285 Cambridge Street
224	80 Newbury Street
225a,b,c	220 Charles Street
226	14 Embankment Road
227	144 Charles Street
228	350 Cambridge Street
229	326 Cambridge Street
230	Cambridge Street Elderly Housing Garage
231	145 Pinckney Street
232	Brimmer Street Garage
233	Boston Common Garage
234	Alley 438
235	4 Newbury Street
236	Ritz Condominiums Garage
237	299 Berkeley Street
238	60 Marlborough Street
239	60 Newbury Street
240a	St. James Avenue
240b	30 Stuart Street
241	St. James Garage
242	John Hancock Garage
244	Blagden Parking Lot
245	683-691 Boylston Street
246	330 Commonwealth Avenue
247	200 Newbury Street
248	278-284 Dartmouth Street
249	Alley 434
250	236 Beacon Street Apartments
251	256 Beacon Street
252	330 Beacon Street
253	Sunoco Gas Station
254	424 Beacon Street
255	Danker & Donahue Garage
256	354 Newbury Street
257	178-180 Newbury Street
259	939 Boylston Street
260	Auditorium Garage
261	Back Bay Hilton
262a,b,c,d	Prudential Center
263	101 Belvedere Street
264	Midtown Motor Inn

265	156-186 Huntington Avenue
266	Colonnade Garage
267	7-23 Follen Street
268	30 Garrison Street
269	Garrison Hall
270	Braddock Park
271	Stuart Street Armory
272a	21 Yarmouth Street
272b	104-106 Dartmouth Street
272c	12-30 Truro Street
272d	25-29 Yarmouth Streety
272e	130 Dartmouth Street
273	Columbus Avenue
274	Boston Center for the Arts
276	Copley Place and Marriott Hotel
277a,b,c	Castle Square
278	National Garage, Inc.
279	35 Buckingham Street
280	75 Clarendon Street
281	Tremont Street
282	57-75 Berkeley Street
283a	Chandler Street
283b	9 Appleton Street
285	John J. Hurley School
287	Pelham Street
288	Stanhope Garage
289	Washington Street
290	367-375 Harrison Avenue
291	345-357 Harrison Avenue
292	Holy Trinity Church
293	Washington Street
294	Washington Street
297	990 Washington Street
299	325-335 Harrison Avenue
300	160 Dover Street
302	25-33 Laconia Street
303	501-509 Harrison Avenue
304	Viviendas La Victoria
305	749 Harrison Avenue
306	Franklin Squre House
307	818 Harrison Avenue
308	80 East Concord Street
309	Stoughton Street
310	East Newton Street
312	Harrison Avenue
312a	East Brookline Street
313	74-104 East Dedham Street
314	623 Harrison Avenue
315a	81-95 East Dedham Street
315b	72-92 East Canton Street
316	U.S. Postal Annex
317	38 Wareham Street

318	40 Wareham Street
320	50-110 Malden Street
322	Harrison Avenue
324	484 Harrision Avenue
325	101 Thayer Street
329	Curve Street
331	370 Harrison Avenue
332	33 Traveler Street
333a	Harrison Avenue
333b	300 Harrison Avenue
333c	Herald Street
333d	Albany Street
334	217-223 Albany Street
335	237-241 Albany Street
337	460 Albany Street
338a	540 Albany Street
339a	Boston Police Tow Lot
339b,c,d	700 Albany Street
340	710 Albany Street
341	Albany Street
342	Massachusetts Avenue & Albany Street
343	Herald Street

Lic #43: H(BRA)	On Conrail Tracks
Lic #45: C(BRA)	40 Wormwood
Lic #113: A(BRA)	191 A Street
Lic #115: B(BRA)	275 A Street
Lic #117: F(BRA)	26 Pittsburgh
Lic #118: D(BRA)	246 A Street
Lic #119: G(BRA)	Northern Avenue
Lic #271: E(BRA)	338 Summer Street
Lic #___: I(BRA)	340 Summer Street

Pr Lots: A(BRA)	U.S. Post Office
Pr Lots: B(BRA)	U.S. Post Office
Pr Lots: C(BRA)	Sobin Park & Mt. Washington Street
Pr Lots: D(BRA)	Silverman Wallcoverings Parking
Pr Lots: E(BRA)	Necco Place
Pr Lots: F(BRA)	Sleeper Street
Pr Lots: G(BRA)	Boston Wharf Company
Pr Lots: H(BRA)	343 Summer Street
Pr Lots: I(BRA)	231-235 A Street

VH2	Congress Street
VH3	Farnsworth Street
VH4	Farnsworth Street
VH5	Pittsburgh Street
VH6	A Street
VH7	A Street

KEY TO NOTES

(A)	Under construction
(B)	Occupancy based on parking lot attendant or operator
(C)	Denied access; visual estimate
(D)	Capacity differs from BRA figure
(E)	BRA count
(F)	Access denied: no estimate
(G)	Government Center Garage; based on 10/21/82 3 PM and 1978 data
(H)	BRA count differs
(I)	12 Noon observation based on 10 AM observation
(J)	10 AM observation based on 12 Noon observation
(K)	Lot converted into park-playground or courtyard
(L)	Observed 10/15/82
(M)	No index number labeled: located on Traverse Street between Canal Street and Friend Street; capacity is labeled as 12
(N)	1978 count indicated 1073 - 10 AM and 1157 - 12 Noon
(O)	$1.25 for each additional 1/2-hour
(P)	Operator estimated usage 410± at 12 Noon and capacity of 716
(Q)	Estimated capacity
(R)	New lot: 597 Washington Street
(S)	Lot mislabeled on off-street inventory map
(T)	Temporarily closed
(U)	Open at night only
(V)	Site occupied by building
(W)	New lot; license #225; 195 Stuart Street; estimated usage based on 2 PM observation

(X)	Corner of Shawmut Avenue and Cobb Street
(Y)	Existing Mobil Gas Station
(Z)	No parking observed
(AA)	MBTA bus parking lot
(BB)	Parking lot could not be located
(CC)	City impoundment lot
(DD)	Location not used for parking
(EE)	Commercial Street between Hanover and Menshomen Streets
(FF)	$25.00 per month
(GG)	Sleeper Street adjacent to licensed lot #119(G)
(HH)	Corner of Farnsworth Street and Congress Avenue; directly across from licensed lot #271(E)
(II)	Easterly side of Farnsworth Street; adjacent to licensed lot #271(E)
(JJ)	Westerly side of Farnsworth Street; north of licensed lot #271(E)
(KK)	Westerly side of Pittsburgh Street; across from licensed lot #117(F)
(LL)	Not in use; adjacent building damaged by fire

Appendix B

Downtown Building Survey Results

Appendix B: Downtown Building Survey Results

Introduction

In September 1982, surveys were conducted at five downtown buildings to obtain information on travel patterns of downtown employees. This information was used to develop assumptions for the parking demand estimation methodology described in Appendix C: Aggregate measures such as Mode Shares can be derived from question #2 of the survey, Auto Occupancy from question #3, and Turnover Rate from question #6. A copy of the survey is presented on the next page.

Methodology

The five buildings were chosen to represent different locations within the downtown and areas where new development is expected. The five buildings selected were 500 Boylston Street (Zone 7a), 470 Atlantic Avenue (Zone 1b), 125 High Street-Travelers Building (Zone 1a), 1 Federal Street-Shawmut Building (Zone 1a), and the Federal Reserve Bank Building (Zone 1b).

At the entrances to the lobbies of the first four buildings, surveys were handed out from 8 am to 4 pm by members of the survey team to both visitors and employees of the buildings . Information on the number of employees was obtained from both building managers and estimates derived from the square footage of the building so that an employee sampling rate could be measured. Generally, workers in the building were less willing to accept surveys in the afternoon, often because they had already been surveyed in the morning. A response rate was also measured for each building by using information on the number of forms distributed and the number of forms returned. Forms were returned either to a member of the survey team or mailed back to Cambridge Systematics, Inc. For the fifth building, the Federal Reserve Bank, managers or other personnel distributed the surveys to the employees. These surveys were later collected by the survey team from the employers. The survey conducted in the fifth building, therefore, did not obtain information on the travel patterns of visitors.

№ 2438

Hello! This survey is being conducted by the City of Boston Traffic and Parking Department to help improve transit and parking conditions in the area. Please take a minute to complete this short survey and return in by dropping it in one of the boxes located in the lobby of this building. Or, you may drop it in the nearest mailbox--no postage is necessary. All responses are, of course, confidential.

If you have already filled out one of these surveys, please disregard this one.

1. Do you work in this building?

6–1 ☐ YES ➤ If YES, how many trips did you make out of the building yesterday (or your most recent working day) during working hours for lunch, errands, etc.?

☐ Number of trips
7

6–2 ☐ NO ➤ If NO, do you work within 10 Blocks of here?

9–1 ☐ YES –2 ☐ NO

2. How did you travel to this building today? (Check as many as apply)

10–1 ☐ Car, van or truck

11–1 ☐ Bus, subway, trolley, commuter rail, commuter ferry

12–1 ☐ Walk, taxi, motorcycle, moped, bicycle

3. If you came here by car, van or truck, how many people, INCLUDING YOURSELF were in the vehicle?

13–1 ☐ One –2 ☐ Two –3 ☐ Three –4 ☐ Four or more

The remaining questions are only for people who came by CAR, VAN or TRUCK parked within 10 BLOCKS of this building:

4. Where did you park?

14 –1 ☐ On the street

–2 ☐ Lot or garage open to public

–3 ☐ Lot or garage reserved for your use

5. How many BLOCKS is it from your parking space to this building?

15–1 ☐ 1 block or less ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 blocks or more

6. How long will you be parked there today?

☐ Hours ☐ Minutes
16 18

7. How many different buildings will you visit (on foot) today while parked at this location?

☐ Number of buildings
20

Thank you very much!

The number of employees for each location, as well as the number of surveys distributed, the number of surveys returned by building employees, the total number of surveys returned, the employee sampling rate, and the response rate are presented in Table 1.

Table 1. Employee Sampling Rate and Response Rate for Each Building

	Building	# Employees (1)	Total # Surveys Distributed (2)	# Surveys Returned By Bldg. Employees (3)	Total # Forms Returned (4)	Employee Sampling Rate (3/1)	Response Rate (4/2)
1.	500 Boylston St.	500	325	143	185	.29	.57
2.	470 Atlantic Ave.	1,665	1,242	515	579	.31	.47
3.	125 High St.	1,425	1,487	527	658	.37	.44
4.	Shawmut Bank	5,515	6,262	1,238	1,953	.22	.31
5.	Federal Reserve Bank	1,400	1,400	931	931	.67	.67
	TOTAL	10,505	10,716	3,354	4,306	.32	.40

The employee sampling rate averaged .32 for the five buildings and ranges from a low of .22 for the Shawmut Building to .67 for the Federal Reserve Bank Building. The reponse rate averaged .40 for the 5 buildings and ranges from a low of .31 for the Shawmut Building to a high of .67 for the Federal Reserve Bank Building. The rather high employee sampling rate and response rate for the Federal Reserve Bank Building resulted from the in-house distribution of surveys to each employee.

Results

a. Work in Building; Work Within 10 Blocks of Building

The majority of the people who answered the survey worked in the building surveyed. At the buildings in which surveys were handed out in the lobby an average of 72.0% of the respondents worked in the building (see Table 2). This figure ranges from a low of 63.4% for the Shawmut Building to a high of 89.0% for 470 Atlantic Avenue, indicating that the percent of visitor responses (out of total responses) was more than three times higher for the Shawmut Building. This is because the Shawmut Building houses the Coop, a commercial walk-in bank and numerous law offices. As mentioned above, only employees were surveyed at the Federal Reserve Bank Building.

Table 2. Percent of Respondents Who Work in Building

Building	Work in Building	Do Not Work in Building (Visitors)
500 Boylston St.	77.1	22.9
470 Atlantic Ave.	89.0	11.0
125 High St.	80.1	19.9
Shawmut Bank	63.4	36.6
Subtotal	72.0	28.0
Federal Reserve Bank	100.0	0.0
TOTAL	78.1	21.9

However, of those respondents not working in the building, an average of 73.2% work within ten blocks of it (see Table 3). This figure ranges from a low of 33.3% for 500 Boylston Street to 79.1% for the Shawmut Building. The fact that the overwhelming majority of visitors to the Shawmut Building work in the area reflects its location in the dense financial core.

Thus, by combining the information in Tables 2 and 3, we see from Table 4 that on average, 93.2% of respondents work in the building or within ten blocks of it. This ranges from 86.0% for 500 Boylston Street to 95.9% for 470 Atlantic Avenue.

Table 3. Percent Who Work Within Ten Blocks of Building (Of Those Who Do Not Work In Building)

Building	Work Within 10 Blocks	Do Not Work Within 10 Blocks
500 Boylston St.	33.3	66.7
470 Atlantic Ave.	56.2	43.8
125 High St.	63.9	36.1
Shawmut Bank	79.1	20.9
TOTAL	73.2	26.8

For the purposes of analysis, those who work in the building or within ten blocks were defined as "workers" (in the area). Parking and patterns of "workers" indicate the long term parking requirements, while those of "nonworkers" indicate short term parking requirements.

Table 4. Percent of Respondents Who are Workers and Percent Who are Nonworkers

Building	Workers (Work in Building or Within Ten Blocks)	Nonworkers (Do Not Work in Bldg. or Within Ten Blocks)
500 Boylston St.	86.0	14.0
470 Atlantic Ave.	95.9	4.1
125 High St.	93.7	6.3
Shawmut Bank	93.0	7.0
Subtotal	93.2	6.8
Federal Reserve Bank	100.0	0.0
TOTAL	94.6	5.4

Therefore, of the first four buildings, the availability of short term parking is most critical for 500 Boylston St., as shown in Table 4 by the relative high percent of respondents who are "nonworkers".

b. Mode Choice (Of Those Who Work in Building)

Almost 60% of all people who worked in the buildings in which the surveys were conducted used transit to get into work, while 35% arrived in automobiles (see Table 5). The transit mode share ranges from a low of 51.4% for 500 Boylston Street, which is located in Zone 7a, to a high of 67.3% for the Shawmut Building, which is located in Zone 1a. The automobile mode share ranges from a low of 26.7% for the Shawmut Building to 42.9% for 125 High Street and a high of 44.3% for 470 Atlantic Avenue. The higher automobile mode shares for these last two buildings may reflect the availability of inexpensive parking across the Fort Point Channel. Only 5.1% of the respondents who worked in the buildings used other modes of transportation to get to work such as walking. However, the mode share for "other" was significantly higher for 500 Boylston Street (13.6%), reflecting the proximity of residential areas in the Back Bay.

Table 5. Mode Choice (Percent of Respondents Who Work in Building)

Building	Auto	Transit	Other
500 Boylston St.	35.0	51.4	13.6
470 Atlantic Ave.	44.3	53.1	2.6
125 High St.	42.9	54.0	3.1
Shawmut Bank	26.7	67.3	6.0
Federal Reserve Bank	38.0	57.0	5.0
TOTAL	35.5	59.4	5.1

c. Auto Occupancy (of "workers")

The average auto occupancy of "workers" was 1.84 persons per vehicle (see Table 6). This figure ranges from a low of 1.67 for the Shawmut Building to a high of 2.02 for 470 Atlantic Avenue and 2.04 for the Federal Reserve Bank Building. More than half (51.5%) of those who came downtown by auto shared a ride. The percent carpooling ranges from a low of 43.4% for the Shawmut Building to a high of 60.6% for the Federal Reserve Bank Building.

Table 6. Auto Occupancy of "Workers"

Building	Number of People in Car				Mean # people in car	% Carpooling
	1	2	3	4		
500 Boylston St.	44.1	35.3	7.5	13.1	1.90	55.9
470 Atlantic Ave.	41.3	30.5	13.0	15.2	2.02	58.7
125 High St.	51.9	29.1	6.2	9.2	1.72	48.1
Shawmut Bank	56.6	28.4	6.5	8.5	1.67	43.4
Federal Reserve Bank	39.4	31.8	15.0	13.9	2.04	60.6
TOTAL	48.5	30.2	9.8	11.5	1.84	51.5

d. Type of Parking Facility

Sixty-six percent of respondents who worked in the building and came into work by automobile said that the car they came to work in was parked in a public lot or garage (see Table 7). This figure ranges from a low of 38.2% for 500 Boylston Street to a high of 82.4% for 470 Atlantic Avenue. Only 9.2%, however, said that the car was parked on the street but this figure is substantially higher for 500 Boylston Street (29.1%), reflecting the availability of on-street parking in the Back Bay at the time of the survey.[1] One fourth of all cars were parked in private lots or garages. This ranges from a low of 11.0% for 470 Atlantic Avenue to 44.0% for the Federal Reserve Building.

Table 7. Type of Parking Facility Where Car Was Parked (Percent of Respondents Who Work in Building and Came Into Work by Automobile)

Building	On the Street	Public Lot or Garage	Private Lot or Garage
500 Boylston St.	29.1	38.2	32.7
470 Atlantic Ave.	6.6	82.4	11.0
125 High St.	4.9	68.5	26.6
Shawmut Bank	9.2	75.8	15.0
Federal Reserve Bank	10.4	45.5	44.0
TOTAL	9.2	65.5	25.2

e. Walking Distance from Parking Space to Building (of those respondents who worked in building and came into work by automobile)

The average distance walked by parkers was 3.35 blocks (see Table 8). There was not much variation in this figure across buildings; walk distance ranged from a low of 2.83 blocks for 500 Boylston Street to a high of 3.56 blocks for 125 High Street. Thirty-six percent of those arriving by car reported that they walked 1 block or less from their parking space. However, 14.7% said they parked 8 or more blocks away from the building. This figure ranges from a low of 5.3% for 500 Boylston Street to 17.9% for 125 High Street and 19.5% for the Shawmut Building. The rather high proportions for these last two buildings as well as those for 470 Atlantic Avenue and the Federal Reserve Building, may reflect the availability of inexpensive long term parking across the Fort Point Channel.

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[1] The availability of on-street parking has changed since the time of the survey due to the institution of resident permit parking, a doubling of meter rates, and stepped-up enforcement of parking regulations.

Table 8. Distance to Parking Space (Percent of Respondents Who Work in Building and Came Into Work By Automobile

Building	Parking Distance (Blocks)								
	1 or less	2	3	4	5	6	7	8 or More	Mean
500 Boylston St.	38.2	14.5	13.2	15.8	9.2	2.6	1.3	5.3	2.83
470 Atlantic Ave.	25.5	23.9	14.9	14.5	5.5	3.9	1.2	10.6	3.20
125 High St.	38.5	10.7	8.0	6.9	9.5	5.3	3.1	17.9	3.56
Shawmut Bank	32.5	18.4	10.7	5.5	7.1	4.5	1.7	19.5	3.54
Federal Reserve	43.1	7.7	9.7	11.5	10.5	3.8	3.4	10.2	3.14
TOTAL	35.6	14.9	10.7	9.2	8.3	4.3	2.3	14.7	3.35

f. Parking Duration (of "workers")

The average parking duration for "workers" who came in by car is 7.71 hours (see Table 9). This figure ranged from a low of 7.45 hours for 125 High Street to a high of 8.17 hours for 470 Atlantic Avenue. Table 9 also indicates that 85.3% parked for 7 hours or more. This figure ranged from a low of 79.8% for the Shawmut Building to a high of 96.3% for 470 Atlantic Avenue.

Table 9. Parking Duration (Percent of "Workers")

		Hours (Up to But Not Including)												
Building	Less Than 1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11+	Mean (Hours)	7 Hours or More (Percent)
500 Boylston St.	5.2	1.7	1.7	1.7	1.7	0.0	1.7	39.7	29.3	10.3	3.5	3.5	7.54	86.3
470 Atlantic Ave.	0.0	0.0	0.4	0.8	0.8	0.0	0.8	38.3	38.7	14.8	3.3	1.2	8.17	96.3
125 High St.	3.8	2.1	3.4	2.1	1.3	2.5	1.7	30.0	37.1	11.8	2.1	1.7	7.45	82.7
Shawmut Bank	4.2	1.5	1.1	2.8	2.8	3.4	3.0	22.8	28.1	20.7	4.2	4.0	7.64	79.8
Federal Reserve Bank	5.8	0.9	0.3	1.2	1.2	1.5	2.7	31.4	32.6	18.0	3.1	1.2	7.69	86.3
TOTAL	3.8	1.2	1.2	1.9	1.7	2.0	2.2	29.7	32.8	17.0	3.4	2.4	7.71	85.3

Appendix C

Methodology for Projecting Future Parking Demand

Appendix C: Methodology for Projecting Future Parking Demand

Overview

Projections of future parking demand generated by new office, retail, and hotel development were made using a three step process:

• trip generation:	application of standard trip rates to planned square footage of development to obtain estimated numbers of daily person-trips generated, by trip purpose (work and non-work).
• modal split:	splitting the projected number of trips generated among different travel modes: automobile, transit, and other (walk, bike, etc.)
• turnover:	applying turnover rates for work (long-term) and non-work (short-term) trips made by automobile to yield peak parking demand.

Parking demand for new residential developments was estimated based on auto ownership information from the 1970 census. This appendix presents the trip generation, modal split, turnover, and other assumptions employed for the calculations of future parking demand in Chapter 3.

Trip Generation

Table C.1 presents trip generation rates for office, retail and hotel uses. These rates were primarily derived from the Institute of Traffic Engineers' Trip Generation Report, which is based on data collected in a range of US urban areas. The rates shown are for round trips. Each rate is broken down in the table into a work trip generation rate and a non-work trip generation rate according to observed trips per employee ratios (see footnotes to table). This was done to allow the methodology to distinguish between long-term and short-term parking demand.

Modal Split/Auto Occupancy

Once the number of trips "generated" by new development is known, the total number of parkers can be established by determining the proportion of

TABLE C.1

Trip Generation Rates
(Round Person-Trips Attracted Daily)

Office 6/1000 sq ft[A]
- 3.9 work trips[B] (employees)
- 2.1 non-work trips (visitors)

Retail 20/1000 sq ft[C]
- 2.8 work trips[D] (employees)
- 17.2 non-work trips (shoppers and visitors)

Hotels 5/room[D]
- 1 work trip (employees)
- 4 non-work trips (includes multiple guest trips and restaurant visitors)

[A] This is the average trip rate for general offices reported in the National Cooperative Highway Research Program (NCHRP) Report 187, "Quick Response Urban Travel Estimation Techniques and Transferable Parameters" (1977). The original source of this figure is the Institute of Traffic Engineers (ITE) Trip Generation Report.

[B] Given the attraction rate per office square footage and assuming an average rate of 4.6 workers 11,000 square feet for Class A office space (Boston Redevelopment Authority: The Office Industry Survey, Part II, 1979), the member of work trips generated per 1,000 sq. ft. of office is estimated to be 3.9, or 65 percent of all trips generated.

[C] This is the average retail attraction rate for high density central business districts reported in NCHRP Report 187 (based on the ITE Trip Generation Report)

[D] Knowing the total trip attraction rate, the number of work trips per 1,000 sq. ft. can be determined by assuming a rate of 3.2 employees per 1,000 sq. ft, and the standard rule of thumb of 1.7 (one-way) trips/employee/day.

[E] Source: NCHRP Report 187 and ITE Trip Generation Report. The estimate of 1 work trip for every five trips was based on professional judgement.

trips made by automobile and the average number of occupants per automobile. In Boston, the following information on modal split and auto occupancy is available:

a. 1982 Cordon Count (adjusted for through trips--see Chapter Two)

	Percent of daily person-trips (6 am - midnite)
automobile	59%
public transportation	33%
bicycle/walk	8%
auto occupancy: (not adjusted for through trips)	1.33 (6-9 am) 1.42 (6 am - midnite)

b. Building Surveys--(see Appendix B)

		Work Trips				
Zone	Building	Auto	Transit	Other	Auto Occupancy	N
7a	500 Boyston St.	35%	51%	14%	1.90	141
1b	470 Atlantic Ave.	44%	53%	3%	2.02	500
1a	125 High Street	43%	54%	3%	1.72	516
1a	Shawmut Bank	27%	67%	6%	1.67	1,171
1b	Fed. Reserve Bank	38%	57%	5%	2.04	931
	All Buildings	36%	59%	5%	1.84	2,259

		Non-Work Trips				
Zone	Building	Auto	Transit	Other	Auto Occupancy	N
7a	500 Boyston St.	60%	24%	16%	1.72	25
1b	470 Atlantic Ave.	87%	9%	4%	1.52	23
1a	125 High Street	77%	13%	10%	1.29	40
1a	Shawmut Bank	51%	33%	16%	1.35	129
1b	Fed. Reserve Bank	NA	NA	NA	NA	0
	All Buildings	61%	26%	13%	1.40	217

c. Central Transportation Planning Staff (CTPS) 1975 Trip Tables

Zone	Percent of Trips by Transit		
	home-based work	home-based other	non-home-based
1	45%	26%	13%
2	49	30	17
3	35	17	11
4	38	18	10
5	50	35	17
6	33	16	10
7	38	20	12
8	21	10	6
9	32	17	9
10	25	15	6
11	32	16	9
12	29	16	10
All Zones	41%	17%	12%

d. Fanueil Hall Shopper Survey (Rouse, 1977)

trip origin (weekday)		mode (weekday)	
home	46%	auto	43%
work	21%	transit	16%
tourist	15%	walk/other	35%

e. BRA Office Tenant Survey (March, 1979)

Location	Percent of Work Trips by Auto
Financial District	32%
Government Center	30%
MidTown	33%
Back Bay	40%
All Areas	34%

f. Downtown Crossing Evaluation Building Surveys (Cambridge Systematics, 1980)

Building	% by Auto
79 Milk	44.4%
100 Federal	40.7
1 Federal	35.5
80 Boylston	32.9
1 Court	31.0
18 Tremont	30.8
100 Summer	28.2
10, 24 Federal	25.9
89 Broad	24.7
1 Washington Mall	24.2
Prudential	23.8
89 State	23.5
City Hall	23.0
230 Congress	21.7
141 Milk	21.4
600 Washington	21.3
60 State	20.7
140 Federal	20.5
185 Tremont	20.0
53 State	19.4
27 School	19.4
10 High	19.0
45 School	18.4
294 Washington	18.0
1 Boston Place	17.0
75 Federal	16.7
99 High	16.7
125 High	16.7
262 Washington	14.3
1 Beacon	14.3
All Buildings	23.7%

Needless to say, there is considerable variation in both modal split and auto occupancy among sources. However, it is clear that modal split varies from area to area of the downtown, according to the level of transit access and parking availability. Based on the available information, together with judgement about relative levels of transit and auto access to the different analysis zones, assumptions about modal split were made for the zones in which new development is projected to occur. These are shown in Table C-2. Auto occupancy was assumed not to vary in a systematic manner by zone, but in general appeared to be higher for work trips than for non-work trips. Average auto occupancies of 1.51 for work trips and 1.31 for non-work trips were assumed, and are consistent with the all-day average of 1.42 observed in the recent cordon count.

These modal split and auto occupancy assumptions were applied to projected numbers of work and non-work person trips to obtain estimates of the number of total daily parkers. The one exception to this, however was non-work trips generated by new hotels. Instead, peak (non-work) parking demand of .25 spaces per room was assumed, based on judgement.

Turnover

Turnover rates of 1 for work-related parkers and 2.67 for non-work related parkers were assumed, based on national experience.

Residential Parking Demand

Peak parking demand per dwelling unit was calculated based on an auto ownership assumptions derived from the 1970 census of .74 autos per dwelling unit, and an assumption that 75 percent of autos owned by residents would be left at home during the day.

TABLE C.2

Modal Split Assumptions: Percent of Trips by Auto

Zone	Work Trips	Non-Work Trips
1a	35%	27.5%
1b	40	39
2a	35	38.5
3	30	35
4	30	35
5a	30	35
5b	40	42
7a	40	48
7b	45	52
9a	45	52
11b	40	48
12	60	56

Example Calculation of Peak Parking Demand: Zone 9a (1985)

Development: 845,000 sq. ft. office
300,000 sq. ft. retail
1,900 hotel rooms
400 dwelling units

Work-Trips Generated: 845 (3.9) + 300 (2.8) + 1900 (1) = 6036

Non-Work Trips Generated: 845 (2.1) + 300 (17.2) + 1900 (4) = 14,535

Work Trips by Auto: 6036 (.45)/1.51 = 1798

Non-Work Trips by Auto: 14,535 (.52)/1.31 = 5769

Work-Related Parking Demand: 1798/1 = 1798

Non-Work-Related Parking Demand:

(14,535 - 4(1900)) (.52)/(1.31)(2.67) + .25(1900) = 1506

Appendix D

Adapting Boston's Parking Freeze in Response to a Changing Downtown Environment

Contents

Page

1. Background D-1
2. Impacts of the Freeze to Date D-2
3. Changes in the Downtown Environment Since 1973 D-3
4. Recommended Freeze and Zoning Code Modifications D-4
5. Impacts of the Recommended Modifications Package D-16

1. Background

Instituted in 1976, the present freeze on commercial parking spaces in downtown Boston limits the number of commercial spaces to the 1973 level of 35,503. New construction of commercial spaces can be done only after the Boston Air Pollution Control Commission (BAPCC) issues a freeze permit. Freeze permits are issued contingent on the proposed facility meeting the BAPCC's criteria, which are:

- sufficient spaces are available in the freeze bank. (Spaces are added to the bank when on- or off-street parking spaces are removed in the freeze area);
- the facility will not add parking to an area already adequately served by existing parking facilities or with adequate transit access;
- it will not contribute significantly to peak period traffic;
- it is located and designed so that the surrounding sidewalks and streets are sufficient to accommodate pedestrians and vehicular movements;
- it has satisfactory access to the major highway serving the area;
- it directly serves development in the surrounding area, and
- its design, including height, bulk, ground floor use, and landscaping, is in accordance with and consistent with architectural and land use patterns in the surrounding area and is itself aesthetically pleasing.

All non-commercial spaces, including residential, and reserved employee and visitor spaces are exempt from the freeze. However, the APCC must grant a special exemption before non-commercial facilities may be constructed.

The boundaries of the freeze area coincide with the area termed "Boston Proper". Boston's zoning code, which was revised in 1973 to eliminate minimum parking requirements for all but residential uses, established a Restricted Parking District (RPD), in which non-residential parking would be considered a Conditional Use, subject to Zoning Board of Appeal approval. The boundaries of the RPD include the freeze area, and extend to the medical area in the Fenway, and parts of South Boston and Dorchester down to

Columbia Point. Zoning Board of Appeal conditions on approval of facilities within the RPD include:

- the facility will serve a traffic demand not adequately provided for by public transportation, or
- it will replace existing off-street parking spaces in one or more nearby parking facilities, or it will replace legal on-street parking spaces that have been physically eliminated through permanent modification or elimination, or
- it is accessory and ancillary to a use which by its nature does not contribute significantly to traffic flows during peak traffic periods, or
- the facility constitutes a temporary parking lot use of land and that serious intent to reuse the land for an allowed use within a specified period of time has been demonstrated to the satisfaction of the Board of Appeal.

Thus, Boston has two overlapping mechanisms for controlling new parking construction. While criteria for approval are similar, the freeze provides a much stricter control tool.

2. Impacts of the Freeze to Date

The APCC began administering the freeze in 1976. In 1981, the City of Boston conducted a study[1] to assess its impacts to date. Major findings of this study were:

- The parking freeze has been successful at limiting the number of commercial spaces to the ceiling level of 35,503.
- Employee and other non-commerical spaces increased by 18% between 1973 and 1980 to a total of 20,260 spaces. However, this increase in non-commercial spaces is less than that which occured in the five years between 1968 and 1973 (a 35% increase).
- Downtown development has proceeded at a healthy pace, unimpeded by the freeze. Between 1973 and 1980, over 8 million square feet of office space were completed, and 5 million additional square feet were under construction.

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[1] Ellen Collins, Boston Redevelopment Authority, Transportation Planning Department, "Downtown Boston Parking Programs", prepared for the Traffic and Parking Department, City of Boston, sponsored by the Metropolitan Area Planning Council, July, 1981.

- The parking freeze has been a contributing factor in restraining automobile usage, further encouraging the use of mass transit, and thus keeping air pollution in check. Between 1964 and 1974, automobile travel to Boston proper increased 20% and transit ridership declined by 11%. Between 1973 and 1980, the split between transit and automobile trips to the downtown did not change significantly.

- The parking freeze has been a valuable tool for preventing the proliferation of open lots downtown, and preserving older buildings which may otherwise have been demolished for parking.

3. Changes in the Downtown Environment Since 1973

While the freeze has been very successful at achieving its objectives, a number of changes have occured since 1973 which provide reason for giving serious consideration to modifying the freeze:

- Unprecedented downtown development has occurred, increasing office square footage by 35 percent between 1973 and 1982.

- An additional 6 million square feet of office and retail space are planned to come on line between 1982 and 1985.

- Peak occupancies of downtown parking facilities have increased from 82 percent in 1972 to 93% in 1982. This occupancy level is sufficiently high to trigger concern about meeting the needs of new development, and in particular, the midday parker.

- Presently, more than 5000 cars are parking in surface lots in the Fort Point Channel, which presently serves as a "pressure valve" for financial district parking needs. As development replaces surface lots in this area, the parking needs of both the Fort Point Channel and the financial district will have to be addressed.

- Increasing development of the Fort Point Channel area, which is not now included in the freeze area, could potentially result in provision of parking for more cars than the street system can efficiently handle. Further, there is a danger that the existing residential areas of South Boston on the fringe of the development area would be threatened by an influx of parking lots and traffic.

- The proliferation of surface lots in East Boston (which is also not included in the freeze area) many of which cater to airport users, is and may continue to infringe on residential neighborhoods in the area.

- The economics of parking construction have changed dramatically, due to rising interest rates and construction costs. This change has made many developers reluctant to build more parking than they feel is absolutely necessary for the economic viability of their buildings.

- Recent downtown parking initiatives in Boston have emphasized meeting the needs of residents and short-term parkers through reserving on-street space in neighborhoods for residential use, expanding the overall on-street parking supply and strictly enforcing these spaces to maintain a high turnover.

- Many surface lots are parking far more cars than their official licensed capacities. The City of Boston will be relicensing these at higher capacities, which could remove as many as 690 spaces from the bank.[1]

- New, innovative strategies are being successfully pursued in many cities throughout the country, which make approval of new development contingent on developer and/or employer commitments to transit and ridesharing incentive programs. These programs have proved to be very effective in increasing the use of transit, carpools and vanpools to the site, which alleviates traffic and parking pressures.

4. Recommended Freeze Modifications

With occupancies of downtown public parking facilities presently at 93 percent, a projected parking space deficit of 8114 spaces by 1985, and 22,632 spaces by 1990, meeting the access needs of future development is a serious concern. Simply relaxing the freeze to allow construction of more parking to satisfy the projected deficit is not a desirable option, on traffic congestion, air quality and economic feasibility grounds. Instead, options should be considered which make the freeze into a more flexible tool for managing future downtown access by (a) increasing parking supply in specific locations on the fringes of downtown where growth in automobile trips can be efficiently handled by the street system and encouraging better use of existing parking facilities, (b) ensuring that adequate space is reserved for midday parkers, (c) encouraging increased use of transit, carpools, and vanpools for access to the downtown, and (d) protecting the residential neighborhoods in East Boston, and across the Fort Point Channel in South Boston.

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[1] This number was derived by subtracting the licensed capacities of lots in the study area from the number of vehicles observed during recent occupancy checks.

Recommended mechanisms for achieving these objectives are described in the following pages and summarized in Table 1.

MODIFICATION A-1: INCREASE SOUTH STATION SUPPLY

DESCRIPTION:	Expand the freeze bank to include an additional 500 spaces at South Station, and an additional 2,500, conditional on a facility designed with a direct link to the highway system. These additional spaces would only be available for allocation to the South Station development site, and not to the rest of the freeze area.
RATIONALE:	This modification is aimed at increasing the downtown parking supply to accommodate the access needs of new development, in a manner that will minimize impacts on traffic. South Station is one of the few locations where sufficient roadway capacity exists to handle additional peak period automobile trips. Its fringe location and proximity to the highway system also mean that adding parking will not significantly increase traffic through neighborhoods or on the downtown street network. Mechanisms for increasing the South Station parking supply by up to 3,000 spaces are presently being studied. These involve incorporating a direct link between the parking facility and the highway system. If and when such a design is committed to, an increase of 3,000 spaces for South Station should be instituted.
IMPACTS:	The downtown public parking supply would be increased by between 500 and 3,000 spaces. While the primary use of these spaces would be for commuter (long-term) parking, additional peak traffic could be accommodated without significant deterioration in traffic flow conditions. Increased parking supply would serve new development in the South Station area, and would accommodate some of the financial district employees now parking in the Fort Point Channel when surface lots there are replaced by new development.

MODIFICATION A-2: INCREASE NORTH STATION SUPPLY

DESCRIPTION: Expand the freeze bank to include an additional 1,500 spaces at North Station. These additional spaces would *only* be available for allocation to the North Station development site, and *not* to the rest of the freeze area.

RATIONALE: Aside from South Station, North Station is the only other logical downtown location for significantly expanding the parking supply without adversely impacting traffic conditions. Assuming that *minor* improvements are made to the Central Artery, an additional 1,500 parking spaces could be added to the North Station area (Zone 3), assuming that the majority of new vehicles would use the Leverett Circle bridge for access to the site.

IMPACTS: Increased public parking availability in the North Station area over and above what would be possible without modifying the freeze.

MODIFICATION B: CONVERSION OF EMPLOYEE SPACES TO PUBLIC SPACES

Description: Allow existing freeze-exempt employee spaces (which have been granted exemptions by December 31, 1983) to be opened up to the public for a fee and expand the freeze bank accordingly.

Rationale: This modification would serve two purposes. First, it would allow spaces in existing reserved employee facilities which are not now used to be made available for public parking. Second, opening employee facilities to the public for a charge would have the added benefit of adequately pricing scarce downtown parking facilities.

Impacts: There are approximately 13,000 reserved employee parking spaces downtown in 134 garages and lots: 42 percent are owned by federal, state and local government organizations, 22 percent by institutional employers (museums, hospitals, churches, charitable organizations, and schools), and 36 percent by other private employers. Average peak occupancy of private facilities is currently 90 percent. If one half of existing reserved employee spaces were opened to the public, an additional 650 spaces (= 10 percent of 6500) would be made available. While many employers feel that reserved employee parking is an important fringe benefit, it is also an expensive one. This freeze modification would provide an incentive for employers to open their facilities to the public, by offering them the opportunity to realize revenues from parking.

A number of studies have shown that employer-provided free parking is an extremely important incentive for commuters to drive alone to work, rather than using transit or ridesharing. One of these studies[1] estimates that approximately 20 percent of those who now drive alone and receive free parking would form carpools or begin using transit to work if required to pay for parking. Applying this figure to the Boston situation (assuming 50 percent of those parking in reserved employee facilities do so for free), overall demand for parking would be reduced by between 440 and 1300 spaces.[2]

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[1] Shoup, Donald, and Pickrell, D., "Free Parking as a Transportation Problem," DOT-RSPA-DPB-50/80/16, October, 1980

[2] The low estimate assumes all 20 percent would shift to carpools; the high estimate assumes all would shift to transit.

MODIFICATION C: MIDDAY PARKING BANK

DESCRIPTION: Expand the freeze bank to include a "midday parking bank" starting January 1, 1984. Spaces would be added to this bank as existing private employee facilities are physically eliminated. Spaces from this bank would be allocated for new facilities on the condition that they would not open before 10 a.m. on weekday mornings.

RATIONALE: Meeting the parking needs of shoppers and visitors to the downtown is an important goal of the City. Observed average occupancies of parking facilities at 10 a.m. are nearing the 90 percent mark, which means that many facilities are full by the time shoppers and other visitors arrive downtown. Future commuter parking demand projections indicate that even if the downtown parking supply were expanded considerably, commuters would continue to occupy most of the spaces and there would still be an availability problem for other kinds of parkers. Therefore, efforts should be made to begin reserving a portion of the downtown parking supply for non-commuter use.

IMPACTS: The maximum number of parking spaces which could potentially be "deposited" into the short-term parking bank is 13,400, the total number of reserved employee spaces. However, those in lots (8545) are more likely to be eliminated. The actual number of these employee spaces which will be eliminated over the next 5-10 years is difficult to predict. Assuming that past trends will continue, between 150 and 200 employee spaces per year would be eliminated, which means that 300-400 would be eliminated by the end of 1985, and 1050-1400 would be eliminated by the end of 1990. Therefore, this modification could result in up to 1400 reserved short-term parking spaces downtown by 1990.

MODIFICATION D: ADDITIONAL FREEZE CRITERION - MIDDAY PARKING NEEDS

DESCRIPTION: Add to the existing freeze criteria: "The facility will serve non-commuter parking needs in the area."

RATIONALE: Because of the projected shortage of visitor/shopper parking in Boston, it is important to ensure that newly constructed facilities will accommodate non-commuter parking needs, in addition to serving all-day parkers. Each new parking facility proposal should be evaluated with respect to existing and projected short-term parking needs in the area, and steps should be taken to ensure that a portion of the facility's capacity will be available for parkers arriving in the middle of the day. Such steps might include: opening a portion of the facility after 10 a.m. or establishing a pricing structure in which the all-day rate is more than 4-5 times the 1-hour rate.

IMPACTS: This modification will only impact new facilities which require freeze permits. At present, only 610 spaces are available in the freeze bank. An additional 3000 spaces may be added to the bank from the four city garages which will be sold (Government Center, Kilby St., St. James Ave., and Fort Hill Sq.), as well as potentially 900 spaces which are now in open lots in the North Station development area. All together, 5310 spaces might be available for freeze permits in the next five to ten years (in the existing freeze area). If other recommended modifications are approved, at least 2000 spaces at North and South Stations and 3500 in the Fort Point Channel area would be added as well, for a total of 10,810 spaces. The portion of these new spaces to be reserved for short-term parking would depend on identified needs at particular locations. While demand projections indicate an additional 3700 spaces needed for short-term parkers by 1985, and an additional 7500 needed (over the present) by 1990, it is unlikely that this many spaces would be reserved. Twenty-five percent of the total spaces, or 2700 spaces is a reasonable estimate of the number which might ultimately be reserved as a result of this modification. (This number is net of the number to be reserved as a result of modification C.)

MODIFICIATION E-1: ACCESS PLANS FOR ACCESSORY PARKING APPROVAL

DESCRIPTION: Make freeze permits for new public parking facilities and granting of exemptions for employee spaces which are ancillary to developments over 100,000 gross square feet contingent on BAPCC review and BRA approval of an access plan for the site, which includes an analysis of expected peak and off-peak travel to the site, and commits to traffic mitigation measures.

RATIONALE: In order to accommodate planned and proposed future development, it will be important to encourage increased use of vanpools, carpools and transit by commuters to downtown. One of the most effective ways of doing this is through marketing these alternatives and offering incentives and assistance at the work-site. A number of cities, including San Francisco and Seattle, are incorporating "access planning" into their development review and approval processes, which requires developers to analyze and mitigate the traffic impacts of their new developments. This approach makes sense for Boston, given the amount of development the city would like to attract and the limited capacity of the street system to handle additional traffic.

IMPACTS: This modification, along with E-2, will result in the establishment of transit and ridesharing marketing and incentive programs in new major developments. This in turn, will encourage greater use of transit and provide employees with increased carpooling and vanpooling opportunities. The impacts on traffic and parking demand are difficult to predict, though if 100 additional vanpools were established (there are presently about 100 in use by downtown commuters; as a comparison, Aetna in Hartford has 100 alone), this would reduce future commuter parking demand by 900 spaces.

However, a reasonable yet ambitious parking reduction goal for this strategy, in combination with other ridesharing and transit incentives and driving disincentives discussed in the body of this report is 13,250 spaces. This assumes that 150 commuters who would otherwise drive alone (given present commute conditions) would form vanpools, 150 would form three-person carpools, and 11,000 would ride either the MBTA or newly-formed subscription bus services.

MODIFICATION E-2: ACCESS PLANS FOR MAJOR DEVELOPMENT APPROVAL

DESCRIPTION: Amend Section 6-3A of Boston's Zoning Code to require BAPCC review and BRA approval of access plans for new developments with over 100,000 gross square feet within the Restricted Parking District.

RATIONALE: Same as for E-1.

IMPACTS: This would make approval of all large developments (with or without accessory parking) contingent on an acceptable access plan. Impacts are discussed under E-1.

MODIFICATION F: ADDITIONAL FREEZE CRITERION - FACILITY DESIGNS FOR VANPOOLS VEHICLES

DESCRIPTION: Add the following criterion for freeze approval: "The facility is designed to accommodate vanpool vehicles."

RATIONALE: Vanpooling is a commuting option which has considerable potential for providing future access to the downtown in an efficient manner. Parking facilities should be designed so that clearances and striping of spaces will accommodate vanpool vehicles.

IMPACTS: The modification will prevent construction of new parking facilities which do not allow for vanpool access, thus assuring that vanpoolers will have the same parking opportunities as people commuting in smaller vehicles.

MODIFICATION G-1: FORT POINT CHANNEL/SOUTH BOSTON PARKING MANAGEMENT DISTRICT

DESCRIPTION: Establish a new "parking management district" encompassing the Fort Point Channel area (Zone 12) and South Boston. Freeze the number of total public parking spaces in this area at the existing 3500 spaces (to be increased if roadway capacity improvements presently under consideration are made). Make approval of new facilities in this area subject to existing BAPCC freeze criteria with the following additional one: "The facility will not increase traffic through residential neighborhoods or displace existing residential land uses."

RATIONALE: Over 1.4 million square feet of development is planned or proposed for the Fort Point Channel area. This development will displace open parking lots which presently park over 5000 cars, and will create the demand for an additional 4500 parking spaces. With the present number of parking spaces, the Northern Avenue bridge is already operating at capacity during peak hours. Thus, unless capacity improvements are made, allowing much more than 5000 parking spaces in this area may worsen an already severe congestion problem.

There is also the concern that the high demand for parking in this area could result in developers acquiring now-residential land for parking facility construction, which would adversely affect the South Boston neighborhood.

IMPACTS: This modification would limit parking supply in the Fort Point Channel area to a level which is in line with existing traffic capacity constraints. It would also protect residential neighborhoods from traffic and parking pressures.

MODIFICATION G-2: EAST BOSTON PARKING MANAGEMENT DISTRICT

DESCRIPTION: Establish a new "parking management district" encompassing East Boston. Make approval of new facilities in this area subject to existing BAPCC freeze criteria and the additional one: "The facility will not increase traffic through residential neighborhoods or displace existing residential uses."

RATIONALE: The proliferation of surface lots in East Boston has raised concerns about resultant impacts on the neighborhoods, namely, displacement of residential uses and increased traffic through neighborhoods as a result of new parking facilities.

IMPACTS: Making approval of new parking facilities subject to the "neighborhood protection" freeze criterion above, and the others, including the one stating that no commercial off-street parking should be added to an area which is already adequately served by existing parking facilities should discourage further proliferation of lots in the area.

5. Impacts of the Recommended Modification Package

The recommended package of modifications to the parking freeze and city zoning code provides for a controlled expansion of the downtown commercial parking supply, while emphasizing management of the parking supply in order to improve overall utilization and reservation of spaces for midday (non-commuter) parkers. It also incorporates measures to manage future access to the downtown by involving developers and employers in programs which mitigate potential traffic and parking impacts of developments. Finally, it establishes mechanisms to protect neighborhoods now outside of the freeze area from traffic and parking pressures.

The following table summarizes the quantitative impact assessments of the individual measures:

Modification		Increase in Public Parking Supply	Potential No. of Spaces Reserved For Midday Parkers	Potential Reduction in Commuter Parking Demand
A-1	Increase South Station Supply	500-3000		
A-2	Increase North Station Supply	1500		
B	Conversion of Employee Spaces to Public Spaces	650[1]		[440-1300][2]
C	Midday Parking Bank	1050-1400[1]	1050-1400	
D	Midday Parking Needs Criteria		2700	
E-1 & E-2	Access Plans			13,250
	TOTALS	3700-6550	2750-4100	13,250

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[1] Would be matched by equivalent decreases in private spaces, and thus would not reduce overall parking deficit.

[2] Included in estimated demand reduction for E-1 and E-2.

The numbers shown above are meant to indicate "order of magnitude" impacts of the modifications package, and must be interpreted in close association with the assumptions on which they are based. However, they indicate that a substantial proportion of the overall public supply increase would be offset by spaces reserved for midday parkers. Thus, the modifications would enable the city to accommodate many more midday parkers than it could otherwise, while increasing the public parking supply available for commuters only slightly.

The air quality implications of the proposed modifications--particularly of an increase in the public parking supply must be assessed by comparing two future scenarios, with and without modifications.

The number of peak automobile trips bound for downtown Boston in 1990 will depend on the amount of development which occurs between now and then, the total (public and private) parking supply, and "exogenous" factors, such as street capacity and the level of transit service available. It is unlikely that the proposed modifications will significantly affect the amount of development which occurs; this will be determined by economic conditions and larger-scale transportation access changes, such as transit service and street capacity improvements.

The impact of the modifications on the total parking supply is difficult to predict, as the number of private spaces would still not be limited by the freeze. Assuming that the same ratio of private spaces per 1000 sq. ft. would be built as between 1968 and 1982, with or without the modifications, total supply would be at most eight percent higher than it would be without them. This is conservative, as it is likely that more private spaces would be built without the modification rather than less.

Despite the potential increases in parking supply which may occur with the modifications, the number of commuters parking downtown is likely to be the same as it would be without the modifications. This is due to the fact that without the modifications, commuters would occupy most (if not all) of the downtown parking supply. The modifications ensure that a portion of spaces are reserved for midday parkers.

Thus, peak period automobile travel is not likely to be significantly higher if the modifications are instituted (as compared to a "no action" scenario). All-day vehicle miles of travel are likely to be higher, as more downtown parking spaces would be used by short-term parkers.

In sum, the proposed freeze modifications will not have a major impact on future travel patterns. Rather, they will provide the City with policy tools for accommodating future development in a manner which minimizes negative impacts such as reduction in space available for short-term parkers, spillover parking in neighborhoods and illegal on-street parking, and encourages developers and employers to become more involved in providing opportunities and incentives for more efficient ways of commuting.

Appendix E

Guidelines for Restriping of Facilities for Compact Cars and Conversion to Attendant Parking Operations

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Downsized Parking Dimensions

As a result of the Federal Government's fuel efficiency standards and the oil crises of the 1970's, the overall average vehicle size has been reduced considerably. The following table illustrates the downsizing trend over the last 10 years.

	Average Dimension[1]			
	Length (ft)		Width (ft)	
Vehicle Type	1973	1983	1973	1983
Standard	19.0	17.0	6.7	6.2
Compact	16.5	15.0	6.0	5.8
Sub-compact	14.0	13.5	5.8	5.4

[1] Source: Parking Design for Downsized Cars, Richard I. Strickland, ITE Journal, November, 1980.

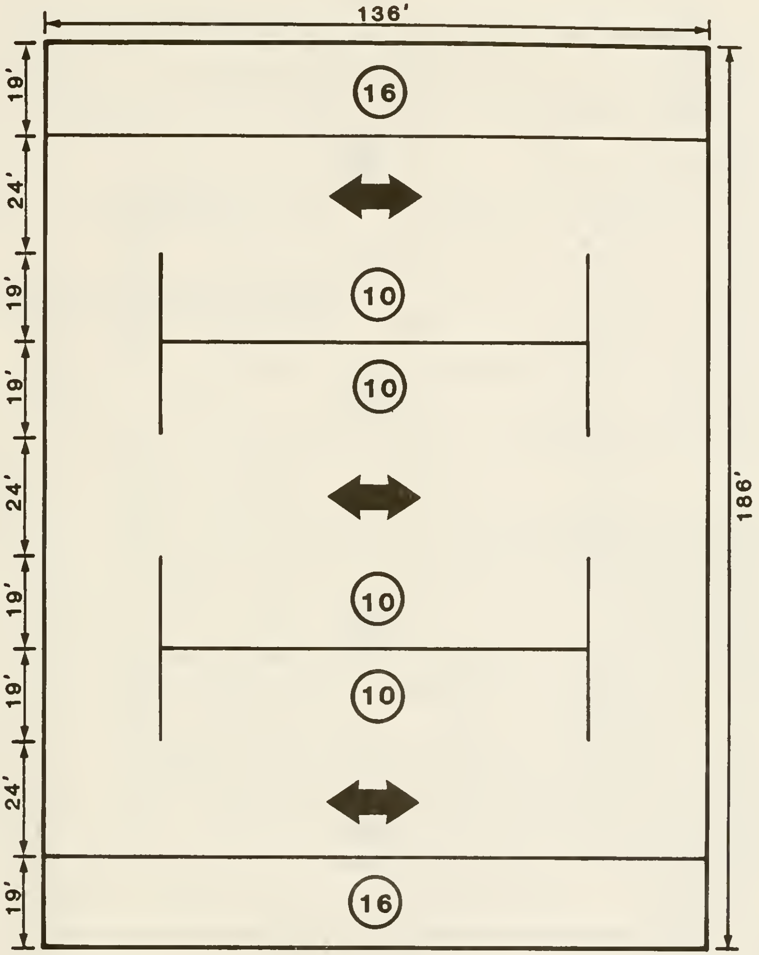
In 1979, as reported by Automotive News, U.S. car sales consisted of 20 percent standard or larger, 45 percent compact and 35 percent subcompact. However, the percent breakdown by vehicle type is extremely variable and depends on geographical location - urban vs. suburban, and parking use - office, shopping, hotel, etc. In 1980, New York City parking areas consisted of 40 to 55 percent standard size or larger, approximately 25 percent compact size and 20 to 30 percent subcompact size vehicles.

Clearly, over time the percent distribution by vehicle type will approach recent car sales. Consequently, the following table was developed and can be applied to present and future parking layout design.

	Parking Angle	Parking Module	Stall Length	Stall Width	Aisle (Car to Car)	Traffic Flow Pattern
Present Standard	90°	62'	19.0'	8.5'	24'	Two-way
	75°	61'	19.0'	8.5'	23'	One-way
	60°	53'	19.0'	8.5'	16'	One-way
	45°	45'	19.0'	8.5'	12'	One-way
Future Standard	90°	56'	17.0'	8.0'	22'	Two-way
	45°	52'	18.0'	8.0'	16'	
Future Compact	90°	54'	15.0'	8.0'	22'	Two-way
	45°	46'	16.0'	8.0'	14'	
Future Sub-compact	90°	47'	13.5'	7.5'	20'	Two-way
	45°	42'	15.0'	7.5'	12'	

There are two apparent methods of converting a typical parking layout from current standard layout to future layout standards reflecting the increasing number of compact cars and the overall reduction of vehicle size. The simplest and easier to implement would be to convert a 16-vehicle space row at 8.5 feet per parking stall to a 17-vehicle space row at 8.0 feet per stall. This would increase overall parking supply by approximately 6 percent.

Another method of converting a current standard size type parking field to a future standard layout reflecting smaller average vehicle size and increasing numbers of compact and subcompact vehicles would be to increase the number of parking aisles. An example of converting a three-aisle parking field with current standard parking dimensions to a four-aisle parking field with future standard dimensions and separate areas for standard, compact and subcompact vehicles is shown in Figures 1A and 1B. This conversion will approximately double the parking supply. However, in order to complete this conversion, it is necessary to institute a one-way circulation pattern. For purposes of this example, it is assumed that support columns or other obstructions and access/egress constraints do not inhibit a one-way circulation pattern. The example shown contains the following breakdown by vehicle type: 25 percent standard, 47 percent compact and 28 percent subcompact.



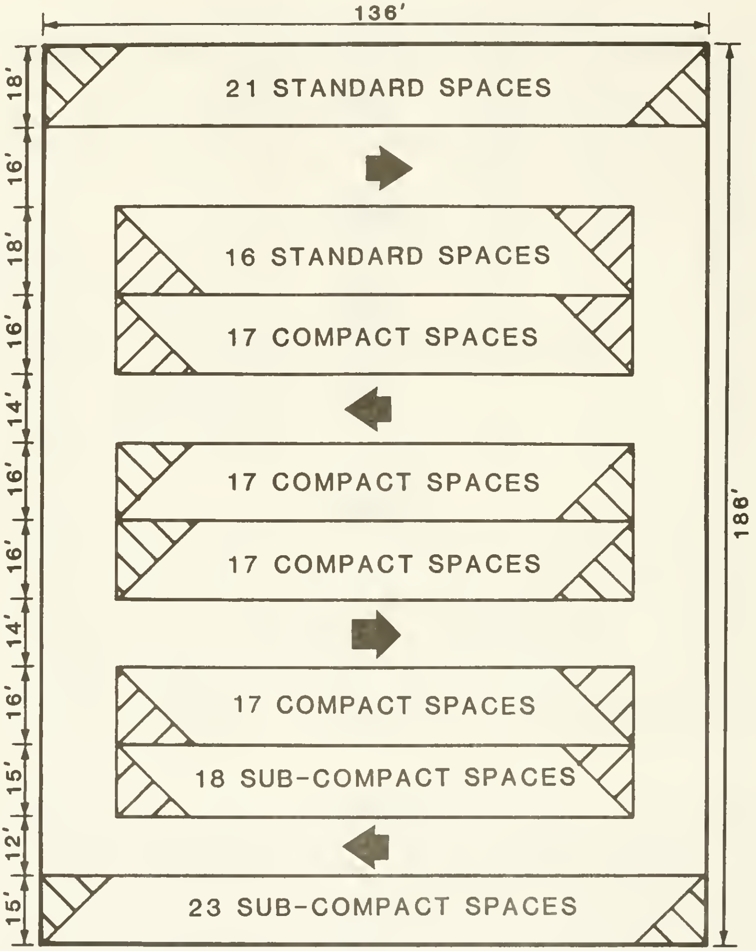
NUMBER OF TOTAL SPACES - 72

City of Boston
Parking Study

Present
Standard
90° Angle
Parking Field

Vanasse/Hangen
Associates
Boston, MA

FIG. 1A



NUMBER OF TOTAL SPACES - 146

City of Boston Parking Study	**Future Standard 45° Angle Parking Field**	Vanasse/Hangen Associates Boston, MA **FIG. 1B**

Most importantly, any conversion of an existing facility will depend on the overall dimension of the existing parking field access/egress constraints, interior structural constraints (for garages only) zoning bylaws, type of parker and percent of vehicle type expected to use the facility. Additionally, for parking fields with standard, compact and subcompact parking space signing and identification of space type is critical.

Tandem or Valet Parking Systems

In converting to attendant parking operation, the objective is to maximize the number of vehicles which can be parked in tandem at an existing facility. The following are general guidelines which should be followed to convert to attendant parking.

Step 1. Characteristics and type of parkers using the facility should be determined. Important characteristics include arrival and departure times, average length of stay and turnover. Obviously, shoppers and typical office parkers should be treated differently with office parkers requiring less internal movement within the tandem parking aisles. The less movement within a tandem parking aisle, the more vehicles can be parked within one aisle with a corresponding reduction in manpower requirements.

Step 2. The existing parking facility should be redesigned to maximize the parking supply by creating tandem parking aisles. Alterations to the internal circulation patterns and relocation of the access/egress drives should be considered.

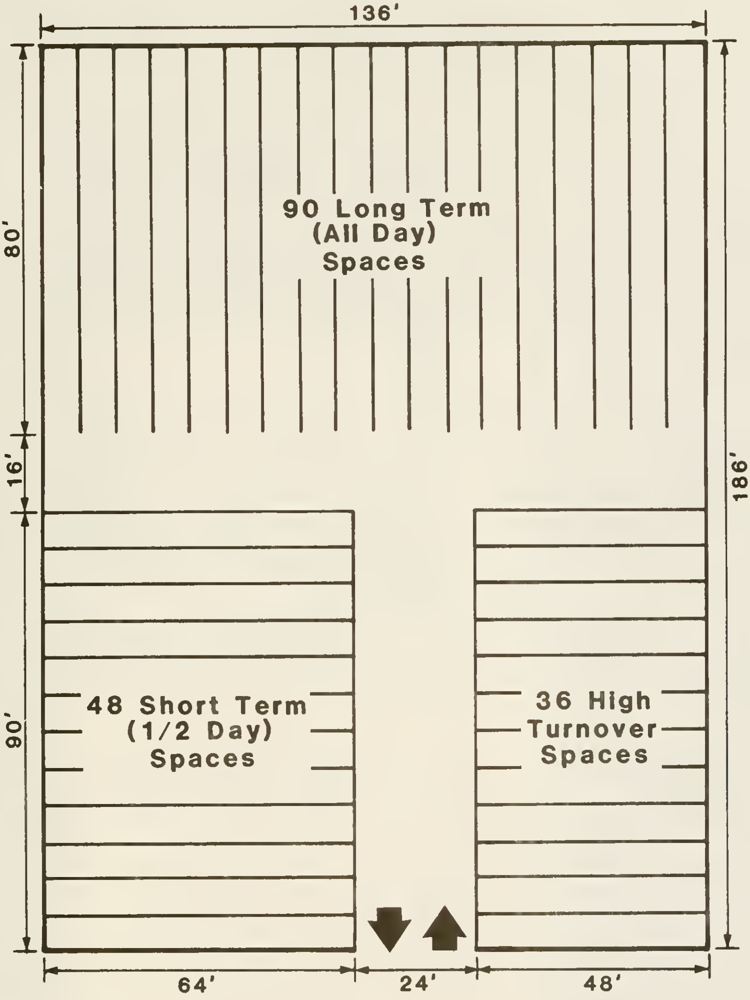
Step 3. With the redesign of the parking facility and an understanding of the parking characteristics, labor requirements should be determined. The size of the facility and the turnover rate are directly proportional to the labor requirements.

Step 4. The pricing structure of the facility should be determined based on labor requirements, land cost, insurance and maintenance fees. With the introduction of attendant parking, labor cost will increase over a self-park facility. Land cost, insurance and maintenance fees will vary slightly between self-park lot and attendant parking facility.

The previously shown 136 foot by 186 foot parking field with current standard dimensions was redesigned to accommodate tandem parking under attendant control and is shown in Figure 2. It is assumed that 50 percent of the parkers are long-term, 30 percent are short-term and the remaining 20 percent are high turnover spaces. The redesign of the facility resulted in a total of 174 spaces, a 140 percent increase over the assumed current standard lot.

Assuming the turnover rate is common for both the standard lot and the redesigned lot, the revenue would increase by the same 140 percent. However, based on the calculation as shown in Table 1 and 16 man-hours required per day at $25 per hour, the net revenue would increase by approximately $300 per day.

Again, it is important to note that in converting an existing parking facility to an attendant parking facility, site constraints will determine the feasibility and efficiency of converting to attendant parking.



City of Boston
Parking Study

Typical
Layout of
Attendant
Parking Facility

Vanasse/Hangen
Associates
Boston, MA

FIG.2

Table 1. Comparison of Standard Lot and Attendant Lot

	No. of Spaces		Turnover Per Space		Average Parking Fee		Total
Standard Lot:							
Long-Term Parkers	36	x	1.0	x	$6.00	=	$ 216
Short-Term Parkers	22	x	2.0	x	$4.00	=	176
High Turnover Parkers	14	x	4.0	x	$2.00	=	112
Total	72						$ 504
Attendant Lot:							
Long-Term Parkers	90	x	1.0	x	$6.00	=	$ 540
Short-Term Parkers	48	x	2.0	x	$4.00	=	384
High Turnover Parkers	36	x	4.0	x	$2.00	=	288
Total	174						$1,212
Labor Requirements			16 man-hours x $25/man-hour =				$ 400
Net Revenue							$ 812
Revenue Increase:			$812 - $504 = $308				$300/day

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